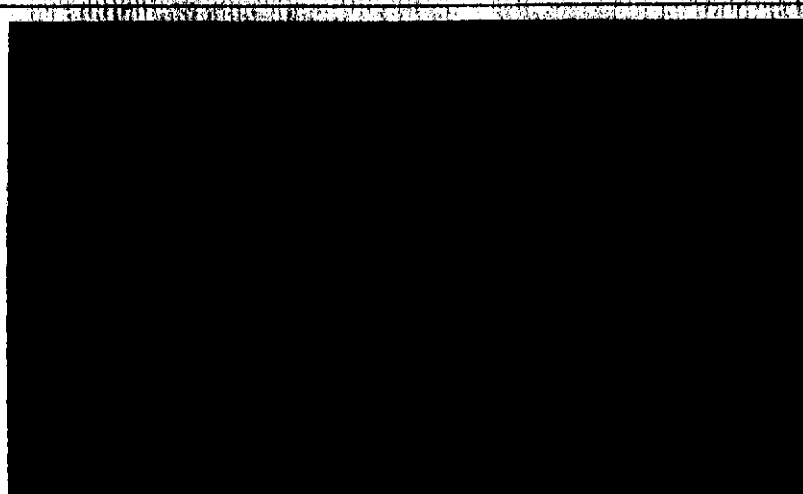


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USER/USE DEVELOPMENT Final Report 104  
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## RESEARCH REPORT



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FINAL REPORT

on

SPACE SHUTTLE TRANSPORTATION SYSTEM  
TECHNIQUES FOR USER/USE DEVELOPMENT

to

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
GEORGE C. MARSHALL SPACE FLIGHT CENTER  
MARSHALL SPACE FLIGHT CENTER, ALABAMA 35812

June 30, 1974

by

Paul J. Gripshover, Program Manager

Contract No. NAS8-30529

BATTELLE  
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;

## ABSTRACT

A study was undertaken to determine techniques for developing the industrial user community for the Shuttle Transportation System. This was one of four studies constituting a Phase I effort. The overall objective of the total NASA program is to develop techniques which will be further evaluated and implemented in Phase 2 and 3 efforts.

The problem of obtaining new uses and users for STS was treated in the same way as marketing problems are handled by any industrial organization. The techniques used by industry to obtain new ideas/uses and new users/customers were evaluated and analyzed for their relevance to the STS. Marketing barriers to the development of the STS user community were also examined. Using this analyzed data, a recommended strategy was developed which calls for the use of a "Middleman" organization to assist NASA in achieving its objectives. This strategy allows NASA to concentrate on what it does best while utilizing another organization(s) to accomplish other things. The importance of prompt initiation of the recommended strategy was established.

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## FINAL REPORT

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INTRODUCTION

The Space Transportation System (STS) represents the single most important venture into space since the Apollo program. Through STS it will be possible to achieve ready and economical access to space for a variety of research and other purposes. After becoming operational, it will permit NASA to successfully fulfill its mission of space research in the 1980's and beyond. To achieve full success, however, it will be necessary to insure STS useage by non-NASA organizations on a paying basis.

Recognizing this need, NASA has undertaken a series of study programs aimed at identifying possible techniques for developing new uses and users for STS. Four Phase I contracts were awarded to the following: Stanford Research Institute (Contract No. NAS8-30533), University of Alabama at Huntsville (Contract No. NAS8-30737), A. D. Little (Contract No. NAS8-30739), and Battelle's Columbus Laboratories (Contract No. NAS8-30529). The SRI study was to deal primarily with Federal Government Agencies other than NASA. The UAH study was to deal primarily with

the educational opportunities offered by STS. The A. D. Little study was to deal primarily with the nontechnical barriers and international considerations for use of STS. The BCL study was to consider ways to identify and obtain industrial user support for STS; this latter study is the subject of this report. The four studies will be used for the basis of a Phase 2 effort which will evaluate the suggested approaches and establish their relative merits. Eventually an implementation of the best approaches would be undertaken by NASA, a contractor, or both.

The ultimate objective of the total program is to insure a high level of non-NASA use of STS. The specific objectives of the BCL study were to determine techniques and approaches which may be suitable for the identification of new uses and users for STS in industry and to develop a recommended strategy for implementation. The involvement of industry is particularly important since it will be through industry that the eventual economical benefits of space will be achieved. Unfortunately, to date few companies outside of the aerospace industry have been involved in space activities or are even aware of the potentials of space. Even those companies which are involved are for the most part participating only under contract to NASA. Techniques are needed to insure broad industry financial support and participation in the future.

This situation is very much akin to the typical marketing problem encountered in industry. It is reasonable to assume that many of the methods used by industry should be quite applicable to the objective of obtaining new uses and users for STS. However this problem takes on interesting proportions when it is noted that with few exceptions NASA has traditionally been in the role of a buyer not a seller of services. Likewise, the organization as a whole has little or no experience in industrial market analysis and development. If NASA is to learn from industrial marketing methods, a very basic examination of the suitability of those techniques is required. That was a major objective of this study.

The BCL effort was a 7-month effort with funding level of \$37,125. Due to financial and time restraints, the scope of the activity

was quite narrow. Efforts were concentrated primarily on developing a strategy to insure use of STS by industry in the future. Implementation of the strategy was not a part of this program. The study was organized into eight tasks as given in Table 1. The relationships among tasks is shown in Figure 1. Note that the tasks primarily were concerned with how to generate new ideas/uses, how to obtain new users, and what barriers to successful development of the new user community might exist. This report covers all work accomplished in the study. Each task is discussed separately except Tasks V, VII, and VIII which were reporting efforts and do not require discussion. Discussion of implementation, conclusions, and recommendations are presented at the end of the report.

**TABLE 1. BCL STUDY PROGRAM TASKS**

---

---

<b>TASK I</b>	<b>ESTABLISHMENT OF THE SIGNIFICANT PARAMETERS OF STS FOR THE USER COMMUNITY</b>
<b>TASK II</b>	<b>ANALYSIS OF TECHNIQUES FOR IDENTIFYING STS PRODUCTS/USES IN INDUSTRY</b>
<b>TASK III</b>	<b>ANALYSIS OF APPROACHES FOR OBTAINING NEW USERS</b>
<b>TASK IV</b>	<b>ANALYSIS OF BARRIERS TO POTENTIAL NASA-USER INTERACTIONS</b>
<b>TASK V</b>	<b>MIDPROGRAM REVIEW</b>
<b>TASK VI</b>	<b>PREPARATION OF AN STS USER DEVELOPMENT STRATEGY FOR INDUSTRY</b>
<b>TASK VII</b>	<b>CONDUCTION OF FINAL PROGRAM REVIEW</b>
<b>TASK VIII</b>	<b>PREPARATION OF SUMMARY REPORT</b>

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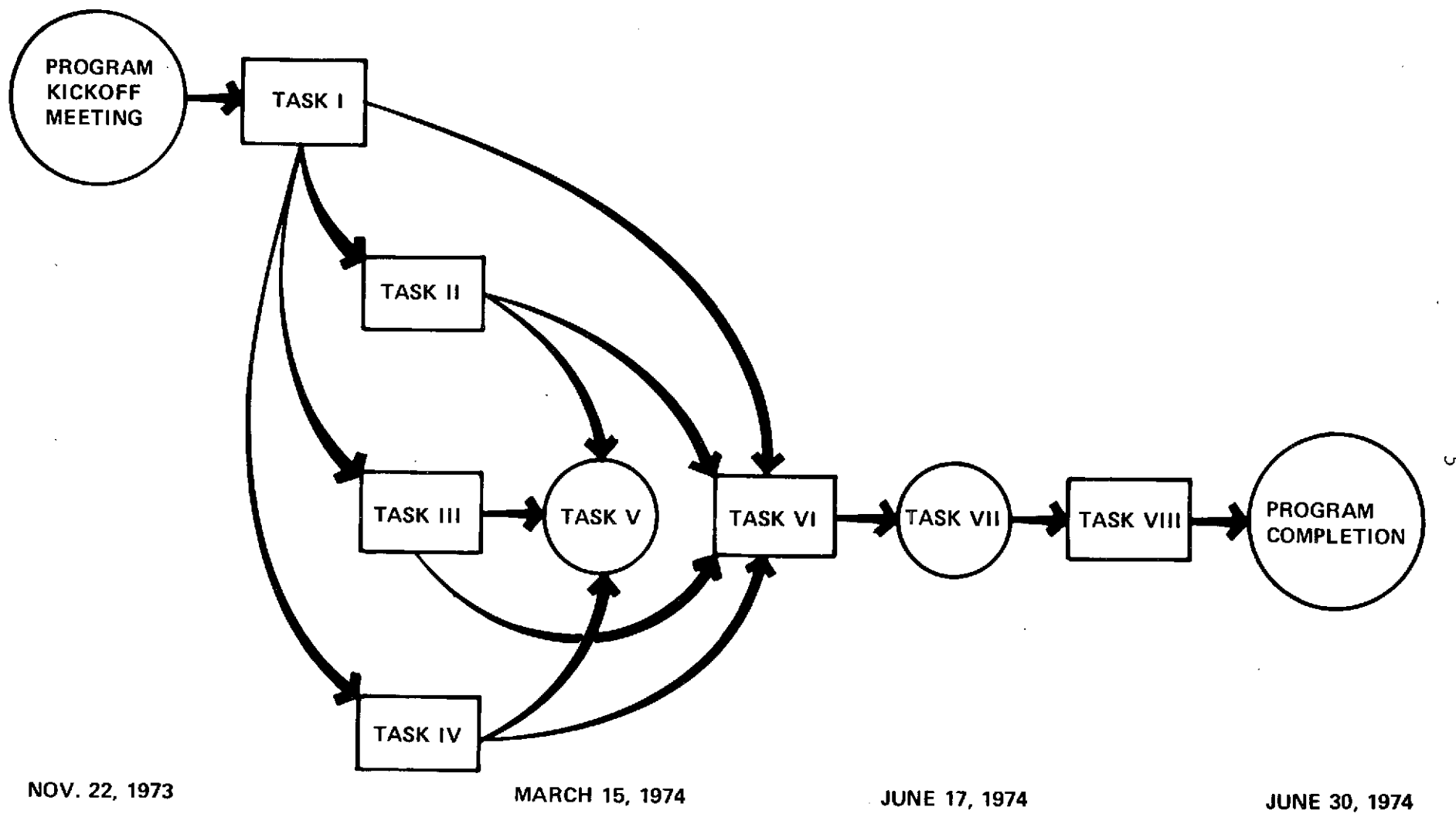


FIGURE 1. RELATIONSHIP OF PROGRAM TASKS

TASK I - ESTABLISHMENT OF SIGNIFICANT PARAMETERS  
OF STS FOR THE USER COMMUNITY

Objective

The objective of Task I was to develop a simple listing that provides the uninformed with the significant parameters of STS of interest to the potential industrial user community.

Procedure

A description of significant parameters of STS was developed to initially orient personnel on the project not necessarily familiar with the Shuttle program and the Shuttle capabilities pertinent to a potential research user community. Significant parameters in this context refers to those relating to the question "what can it do" in a business sense as opposed to detailed systems data. Second, a set of reference documents providing detailed information on the Shuttle was set up and maintained as a reference library throughout the study program.

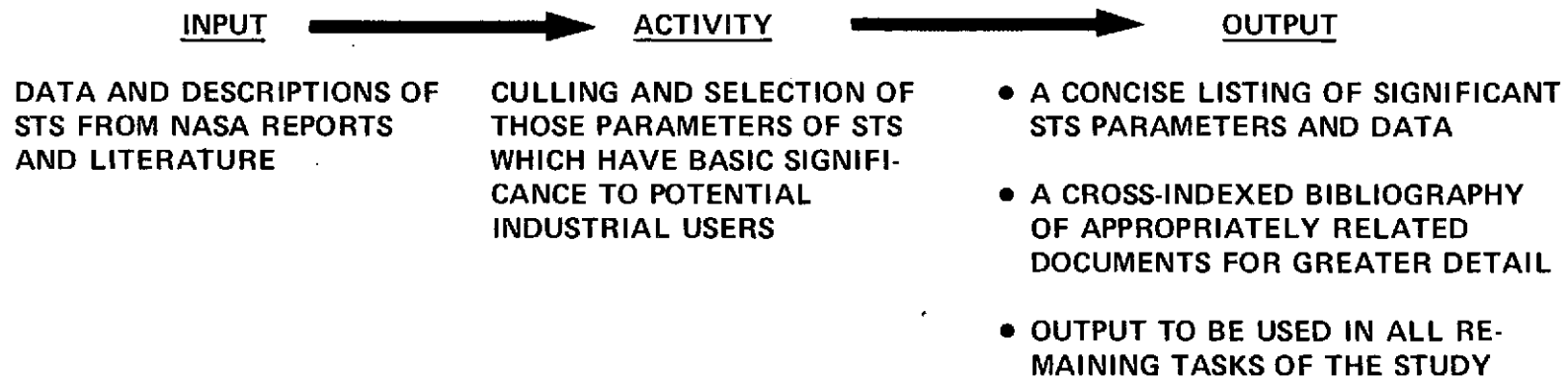
Table 2 shows the input-output data relationships for Task I. Initially, several documents, predominantly NASA publications, were used to summarize the Shuttle by operational modes of planned use, i.e., earth or parking orbit booster, establish and maintain automated payloads in space, and sortie mode. Subsequently a presentation was made to study-program personnel to brief them on the Shuttle. At that time they were apprised of the significant number of reference documents available for detailed information, if required. A selected list of 33 documents made up the reference library. A cross reference to eight major Shuttle parameters, (space benefits, Shuttle overview and mission description, mission planning, payload accommodations, payload planning, Space lab, payload descriptions, and beneficial uses of space) was made to the 33 reference documents.

TABLE 2. INPUT-OUTPUT DATA RELATIONSHIP FOR TASK I

---

**TASK I – ESTABLISHMENT OF THE SIGNIFICANT PARAMETERS OF STS  
FOR THE USER COMMUNITY**

**OBJECTIVE: TO PROVIDE A SIMPLE LISTING THAT PROVIDES THE UNINFORMED  
WITH THE SIGNIFICANT MARKET-RELATED PARAMETERS OF STS**



### Results

The results of Task I are presented in Tables 3 through 6. The information has proven most useful in orienting specialists in other fields about what STS is and what it can do. This information will form an excellent base for preparation of management-oriented presentations during the implementation of new user/use activity.

TABLE 3. MODES OF USE OF SPACE TRANSPORTATION SYSTEM

- 
- 
- I. Earth or Parking Orbit Booster
    - Spacecraft plus one or more propulsion stages (Tug, etc.)
    - Geostationary, eccentric orbits and planetary missions
  - II. Establish and maintain automated observatories in space
    - Spacecraft only (no additional propulsion other than OMS)
    - Polar and low inclination, low altitude orbits
    - Repair, replacement and refurbishment of components, subsystems, or entire spacecraft
    - Lifetimes of spacecraft in orbit - 10 years
  - III. Sortie mode
    - Support a program of multidisciplined exploratory research and instrument/technology development
    - Spacelab/pallet
    - Research may be manned, automated or a combination of both
    - Instruments, equipment-experiments
    - 1-7 payload specialists (scientists, engineers, technicians)
    - Dedicated labs, experiment modules, carry-on experiments
    - Mission duration 7-30 days in low earth orbits (100-235 n mile)
    - Space environment for research
      - Zero-g
      - Very hard vacuum
      - Total solar spectrum
      - Space radiation
      - Isolation from terrestrial environment (vibration, seismic and acoustic noise, contamination)
      - Launch/reentry conditions
- 
-

TABLE 4. STS CHARACTERISTICS

- 
- 
- Multidisciplined science and applications missions
    - Astronomy
    - Solar physics
    - High energy astrophysics
    - Atmospheric and space physics
    - Life sciences
    - Communications and navigation
    - Earth and ocean physics
    - Materials science and space processing
    - Space technology
  - Planned user involvement
    - Perform research for a user
    - Provide space facility for user use (research or applications)
    - Obtain data for users (earth observations)
    - Provide a space "system" test/demonstration facility
  - Provides low cost transportation as an economical extension of on going manned and unmanned space programs in science, applications, and technology
  - Payloads
    - Automated
    - Sortie
  - STS operational modes
    - Payload delivery
    - Payload retrieval
    - Payload repair/servicing
    - Manned orbiting lab/workshop (sortie mode)
  - STS provides access to unique space environment
    - Zero-g
    - Low level vibration
    - Unconfined vacuum
    - Contamination free
    - Thermal
    - Solar spectrum
  - STS provides benefits
    - New materials processing (space processing)
    - Observations (Astron, solar, planetary, earth, etc.)
    - Advanced technology R & D
    - Solve energy crisis (Solar energy - find oil)
    - Solve pollution problems (Violators, monitoring)
    - Communications/navigation
    - Accurate LEO placement of payloads
    - Advances in science (Astronomy, Physics, Chemistry, + Life Sciences, etc.)
- 
-

TABLE 5. SHUTTLE PARAMETERS - CROSS REFERENCED TO DOCUMENTATION

---



---

1. Space/Space Benefits	
Reference 1	
2. Shuttle Overview, Policy, Mission Description	
References 2, 3, 5, 11	
3. Mission Planning	
References 6, 7, 8, 26, 29	
4. Payload Accommodations (Performance, Crew, Mission, Avionics, Attitude Control, Induced Environments)	
References 3, 4	
5. Payload Planning	
References 2 (Vol. II), 14, 27, 28, 30	
6. Sortie/Spacelab	
References 2 (Vol. I), 9, 12, 13	
7. Payload Descriptions/User Requirements	
Sortie Payloads - References 10, 17, 18, 19, 23, 24, 25, 32	
Automated Payloads - References 15, 16, 31	
8. Beneficial Uses of Space	
References 1, 20, 21, 22, 33	

---



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TABLE 6. STS REFERENCE DOCUMENTATION

- 
1. Space for Mankind's Benefit, NASA SP-313, November, 1971, NLVP Library 73-236.
  2. Proceedings of the Space Shuttle Sortie Workshop, NASA GSFC, July-August, 1972, NLVP Library 72-469.  
     Vol. I -Policy and System Characteristics  
     Vol. II-Working Group Reports
  3. Space Shuttle Presentation to Space Sciences Summer Study, Woods Hole, Massachusetts, July, 1973.
  4. Space Shuttle System Payload Accommodations - Level II Program Definition and Requirements, JSC 07700, NLVP Library 73-494.
  5. Space Shuttle Program Requirements Document, Level I, NASA OMSF, May, 1973, NLVP Library 73-307.
  6. The 1973 Space Shuttle Traffic Model, NASA MSFC, July, 1973 (NASA TMX-64751), NLVP Library 73-496.
  7. The 1973 NASA Payload Model, Space Opportunities 1973-1991, NASA June, 1973, NLVP Library 73-435.
  8. Integrated Mission Planning, First Two Years of Shuttle Missions (1979-1980), NASA MSFC, July, 1973.
  9. Sortie Lab User's Guide, NASA MSFC, April, 1973, NLVP 73-489.
  10. Sortie Lab User Requirements, NASA MSFC, April, 1973.
  11. Space Shuttle Presentations for ESRO, NASA, JSC, April, 1973.
  12. Spacelab Guidelines and Constraints for Programme Definition, Level 1, NASA MF-73-1, September, 1973.
  13. The Design and Utilization of a Spacelab for Sortie Missions, Douglas R. Lord, Presentation at the XXIV International Astronautical Congress in USSR, October, 1973, NASA.
  14. Final Report of the Space Shuttle Payload Planning Working Groups, NASA GSFC, May, 1973, NLVP Library 73-315.  
     Executive Summaries  
     Astronomy - Vol. 1  
     Atmospheric & Space Physics - Vol. 2  
     High Energy Astrophysics - Vol. 3  
     Life Sciences - Vol. 4  
     Solar Physics - Vol. 5  
     Communications & Navigation - Vol. 6
-

TABLE 6. STS REFERENCE DOCUMENTATION (Continued)

- 
- Earth Observations - Vol. 7
  - Earth and Ocean Physics - Vol. 8
  - Materials Processing and Space Manufacturing - Vol. 9
  - Space Technology - Vol. 10
15. Summarized NASA Payload Descriptions - Automated Payloads, NASA MSFC, October, 1973, NLVP Library 73-549.
  16. Payload Descriptions, Volume I, Automated Payloads, NASA MSFC, October, 1973, NLVP Library 73-550.
  17. Summarized NASA/ESRO Payload Descriptions (Sortie Payloads), NASA MSFC, October, 1973, NLVP Library 73-497.
  18. Payload Descriptions, Volume II, Sortie Payloads, NASA MSFC, October, 1973, NLVP 73-498.
  19. A Shuttle Compatible Advanced Technology Lab., W. E. Sivertson, NASA Langley, AIAA Paper No. 73-611.
  20. Study for Identification of Beneficial Uses of Space (Phase I), Final Report, General Electric, December, 1972.
    - Vol. I Executive Summary
    - Vol. II - Books 1-4 Technical Report
  21. Economic Analysis of Crystal Growth in Space, Final Report, General Electric, July, 1972.
  22. Space Processes for Extended Low-G Testing, General Dynamics, CASD-STT-73-005, June, 1973.
  23. Requirements and Concepts for Materials Science and Manufacturing in Space Payload Equipment Study, TRW, July, 1973.
    - Experiment Functional Requirements - Vol. IIA
    - Equipment and Instrument Identification - Vol. IIB
    - Experiment/Equipment Review - Vol. IIC
    - Payload Equipment - Vol. IID
    - Operations Analysis - Vol. IIE
    - Programmatics - Vol. III
  24. Mission Requirements for a Manned Earth Observatory, Final Report, TRW, March, 1973.
  25. Plasma Physics and Environmental Perturbation Laboratory (PPEPL), TRW.
    - Executive Summary and Performance Reviews 1, 2, 3.
-

TABLE 6. STS REFERENCE DOCUMENTATION (Continued)

- 
26. Space Shuttle Mission and Payload Capture Analysis (includes report on BRAVO-Business Risk and Value of Operations in Space), The Aerospace Corp., June, 1973, ATR-73(7311)-1.  
Executive Summary - Vol. 1  
Final Report - Vol. 2
  27. Discipline Working Group Atmospheric and Space Physics, Draft of Woods Hole Conference, July, 1973, NASA.
  28. High Energy Astrophysics Discipline Group Report (Woods Hole), Study on the Scientific Use of the Space Shuttle, NAS, July, 1973.
  29. Space Shuttle and Planetary Missions, NASA, May, 1973.
  30. Study of Airborne Science Experiment Management Concepts for Application to Space Shuttle, ASSESS Program, NASA ARC, TMX-62, 287, July, 1973.
  31. A Plan for the Use of the Basic Atmosphere Explorer Spacecraft System as a Subsatellite of the Shuttle, NASA GSFC, May, 1973.
  32. Sortie Lab Hitchhiker Experiment Module System, NASA GSFC, May, 1973.
  33. Manufacturing in Space, Hans F. Wuenschel, NASA MSFC, September, 1972.
-

TASK II - ANALYSIS OF TECHNIQUES FOR IDENTIFYING  
STS PRODUCTS/USES IN INDUSTRY

Objective

The objective of Task II was to identify all methods which might be employed in establishing industrial products or uses of STS.

Procedure

A wide variety of methods are employed in industry and contract research organizations for generating new ideas for products or new uses of existing products. Specialists in this field prepared a detailed listing and brief description of those methods. This listing was intended to be a primer for use in structuring organizational approaches to idea development. Comments were prepared regarding which method might be suitable and how each might apply to STS. Finally, an analysis and judgement were made regarding whether each method could best be accomplished by NASA alone, another organization, or equally well by either one. This subjective judgement represented the conclusion of a committee of three. Where another organization was deemed best, it usually was because of specialized skills involved or the belief that the objectivity gained by not having NASA directly involved was important. It should be pointed out that given enough time, effort, and dollars, NASA could probably successfully utilize most, if not all, of the methods identified. Table 7 presents the input-output relationship in Task II.

Discussion of Results

The results of the identification and analysis efforts are given in Table 8. Five major methods for identifying new products, services, or applications were considered. These included (1) literature and other mass media source methods, (2) people source methods, (3) group creativity methods, (4) analytical methods, and (5) miscellaneous

TABLE 7. INPUT-OUTPUT DATA RELATIONSHIPS FOR TASK II



<u>INPUT</u>		<u>ACTIVITY</u>		<u>OUTPUT</u>
RELATED EXPERIENCE OF INDUSTRIAL AND CONTRACT RESEARCH ORGANIZATIONS IN DEFINING NEW PRODUCTS		DEVELOP A LISTING AND DESCRIPTION OF ALL METHODS USED BY INDUSTRY FOR DEVELOPING PRODUCTS IDEAS AND USES. APPLY EXPERIENCE OF SPECIALISTS TO ESTABLISH THE VALUE OF THESE METHODS FOR NASA AND STS		<ul style="list-style-type: none"> <li>• A PRIMER OF TECHNIQUES FOR NEW PRODUCT IDEA DEVELOPMENT FOR USE BY NONSPECIALISTS</li> <li>• AN ANALYSIS OF THE RELATIVE STRENGTHS AS APPLIED TO THE STS</li> <li>• THE RESULTANT DATA TO BE USED IN TASK VI – DEVELOPMENT OF RECOMMENDED STRATEGIES</li> </ul>

TABLE 8. METHODS FOR IDENTIFYING NEW PRODUCTS, SERVICES, AND APPLICATIONS

Subject	Description	NASA Only	Either NASA or Others	Comments
<b>A. Literature and Other Mass Media Source Methods</b>				
1. Catalogs (own, suppliers, customers, competitors, others)	Leaf through catalogs in appropriate fields to get ideas.	•		Using catalogs as sources of ideas can be productive for rather specific, established areas. For NASA services it is not recommended initially since hundreds or thousands of catalogs might be indicated. Later, when more specific areas have been selected, catalogs are a possibility for NASA.
2. SIC Index	Go through the SIC Index to get a rather complete picture of products and services in the United States.	•		Rather than a source of ideas for NASA, the SIC index could better be used as a guide to organization, or as a basis of systematically examining each industry of interest. It is especially good to insure that a comprehensive consideration has been given to industry.
3. Patent Index	Review Patent Gazette or other patent lists or patents to get ideas for new products.	•		This can be a possible source for NASA to trigger ideas within previously selected areas of application for the shuttle service. As an initial source it is overwhelming.
4. Government reports (NASA Technical Utilization Literature, NTIS, SBA Publications, etc.)	Review Government reports, bibliographies, or indexes in fields of interest to get ideas.	•		Most reports are good for details within specific areas, not as an initial source of ideas.
5. Company reports (internal, others)	Check internal or other company reports on R&D, manufacturing, etc. for ideas.	•		These are good sources once specific types of companies have been identified as possible customers. They can provide insight into what major interests and problems are. NASA can then try to relate the shuttle service to the indicated needs.
6. Annual reports	Review company annual reports in fields of interest for ideas.	•		These are similar to other company reports, but usually on a more general basis. Their main value is to provide leads as to whether specific companies might have an interest in specific applications of the shuttle.
7. Trade papers and journals	Check articles, news items, and other features in trade and other periodicals for ideas.	•		These can be excellent leads to current efforts, problems, needs, obstacles, etc. that could use NASA services. It can be extremely time consuming to review literature in a variety of areas.
8. Advertisements	Look at ads for ideas.	•		Ads in trade journals can be almost as useful as the editorial matter. Should be included in reviews of literature.
9. Tables of contents	Check tables of contents of pertinent books and periodicals for ideas.	•		Tables of contents are not among the better sources of ideas. They are often incomplete, misleading, and difficult to understand. Not recommended for NASA.
10. Indexes	Check indexes of books and periodicals for ideas.	•		Indexes are similar to tables of contents, but even harder to use. Not desirable for NASA idea collection.
11. Yellow pages	Look at telephone book yellow pages for ideas.	•		Yellow pages are useful for consumer products and standard industrial products. Not pertinent to NASA shuttle service.
12. Want ads	Go through classified ads in periodicals for ideas.	•		Classified are usually an inefficient sources of ideas. Not good for shuttle service.

TABLE 8. METHODS FOR IDENTIFYING NEW PRODUCTS, SERVICES, AND APPLICATIONS (Continued)

Subject	Description	NASA Only	Either NASA or Others	Others Only	Comments
13. Repair manuals	Look at pertinent repair manuals to find ideas for components.		•		Repair manuals are best for details or specific ideas in a highly selected area. As a source of ideas they have no pertinence to NASA services. At a later stage they may be useful to closely define applications.
14. Books	Review books to trigger ideas.		•		Books are time-consuming, inefficient sources of ideas. Not recommended for NASA.
15. Bibliographies and abstracts	Check bibliographies and abstracts in fields of interest to find ideas.		•		These have most of the problems of tables of contents--they are misleading or hard to understand. They have little value for getting ideas for the shuttle service.
16. Television	Watch television programs as suggestive of ideas.		•		This is usually not a method that can be forced. Sometimes a TV program suggests ideas, sometimes it doesn't. NASA people after ideas should keep it in mind.
17. Radio	Listen to radio as a source of ideas.		•		Radio is less stimulating of ideas than TV for most people. However, the rather odd lyrics of many popular songs may suggest musical ideas. Likewise the ads. NASA should use it as warranted by situations.
18. Phonograph records and tapes	Listen to records and tapes as inspirations for ideas.		•		Records and tapes are about the same as radio without the ads. Record or tape buffs at NASA may want to try it if they are after ideas.
19. Movies	Watch movies for the purpose of getting ideas.		•		Movies are similar to TV without the ads and with less variety. NASA may want to try it.

TABLE 8. METHODS FOR IDENTIFYING NEW PRODUCTS, SERVICES, AND APPLICATIONS (Continued)

Subject	Description	NASA Only	Either NASA or Others	Others Only	Comments
B. <u>People Source</u>					
<u>Methods</u>					
1. <u>Customers</u>					
a. Mail survey	Questionnaires are mailed to customers (or potential customers) asking for uses, features, modifications, etc., concerning a product, service, or application.				Customers are not a source for NASA since there are none for the shuttle service at present. Thus potential customers must be used. As initial sources for ideas, customers are poor. They are much more useful as sources of information concerning ideas suggested to them. They can modify ideas, point out obstacles or advantages, etc. Or, they can sometimes point out problems they have which can trigger ideas for solving the problems. In most cases, the effort is inefficient and costly. Identification of companies and people within companies can be difficult. Mail surveys are not useful for complex situations such as the shuttle service.
b. Telephone survey	Same as a. above, but by phone				Telephone surveys can be a useful supplement to personal surveys for complex situations and are useful for NASA. A third party experienced in using the techniques is indicated.
c. Personal survey	Same as a. above, but by personal visit				Personal surveys are useful for getting customer information for complex situations. The give and take of a discussion can provide valuable information. A third party experience in the techniques is recommended for NASA.
d. Panel	A group of customer types is assembled to discuss problems and give ideas.				It is difficult to assemble such a panel, but results can be useful. It is a time-consuming and costly method. If used by NASA, a third party is indicated to do the work.
2. <u>"Experts"</u>					
a. Consultants	Consultants are hired to provide ideas.				Consultants and research organizations can be highly useful in getting ideas. Battelle has a substantial segment of business involving the origination of ideas. These sources can provide objectivity, selectivity, efficiency, and comprehensiveness. Highly recommended for the NASA shuttle service.
b. Associations	Personnel of trade associations or professional societies are contacted for ideas.				Associations and societies can provide overviews of industries or functional areas. This can suggest areas for more detailed attentions. Also, they can sometimes pinpoint industry problems that will trigger ideas. Should be used by NASA.
c. Publishers	Editors or other staff of trade and other publishers are contacted for ideas.				Publishers are sources similar to trade associations in types of information and value.
d. Government	Government employees are contacted for ideas.				Government employees in pertinent agencies can have useful ideas. NASA can best contact these themselves.
3. <u>Suppliers</u>					
	Solicit ideas from suppliers concerning other uses for the items they supply.				This method can be useful to NASA, but it can be difficult to get suppliers to think in terms of ideas.

TABLE 8. METHODS FOR IDENTIFYING NEW PRODUCTS, SERVICES, AND APPLICATIONS (Continued)

Subject	Description	NASA Only	Either NASA or Others	Others Only	Comments
4. <u>Competitors</u>	Discuss product lines with competitors to get suggestions for new products or applications.			•	Since there is no direct competition for the NASA shuttle service, it will be necessary to look at other types of things that compete--vacuum systems, refrigeration systems, instrumentation, etc. Since it can be a delicate matter to approach competitors, a third party is recommended for NASA for this method.
5. <u>Internal people</u>					
a. Chief officer	Get ideas from president or chairman.	•			The president or chairman of one's company can have useful ideas. But he may be difficult to tap. His strong point is in seeing his company from an overall point of view. NASA should seek ideas from its chief officer.
b. Salesmen	Get ideas from salesmen concerning what they learn from customers.	•			Salesmen are highly variable as to how many and how good their ideas are. If they are alert they can get many ideas from their customers over a period of time. These ideas are likely to be highly pertinent and timely. However they must be objectively analysed to make sure that many customers are interested rather than only a few. Since NASA has no salesmen, this method does not apply.
c. R&D personnel	Solicit ideas from R&D employees.	•			R&D personnel are often excellent sources of ideas. Often the ideas are well developed. However, they are often pet interests of their sources without regard to practicality or commercial value. Thus, they must be carefully evaluated by knowledgeable and objective people. It is to be expected that NASA R&D personnel will have many ideas for the shuttle, so they should be tapped. But most ideas will not be realistic so drastic screening will be necessary.
d. Staff solicitation	Send a memo or questionnaire to all or selected employees asking for ideas	•			This can result in a large number of assorted ideas. NASA should use this method. All should be considered, but probably very few will be of value.
6. <u>Meetings</u>					
a. Trade shows	Look at exhibits and discuss with booth personnel to get ideas			•	Trade show displays can trigger ideas, show what is going on in an industry, reveal what individual companies are doing, etc. A third party can do this best for NASA.
b. Technical Society meetings	Listen to papers and discuss with other attendees to get ideas.		•		Technical society meetings and discussions can reveal what's going on in various fields of science and technology, and the problems being faced. These can be used as guides to ideas. NASA should use this method for the shuttle service.
c. Trade Association meetings	Listen to talks and discuss with other attendees to get ideas			•	This should be combined with trade show activities by a third party for NASA. Value is similar to technical society meetings method, but perhaps more practical and on an industry basis rather than a technology basis.

TABLE 8. METHODS FOR IDENTIFYING NEW PRODUCTS, SERVICES, AND APPLICATIONS (Continued)

Subject	Description	NASA Only	Either NASA or Others	Others Only	Comments
7. "Friends"	Discuss with friends at work, neighborhood, social groups, etc., to get ideas.	•			NASA people seeking ideas should be sure to discuss their needs and problems with friends and family. Informal discussions over lunch or otherwise can be highly productive of ideas.
8. "Strangers"	Discuss with strangers on planes, commuter trains, church, etc., to get ideas.		•		This can be a hard method to use since the occasion may not arise whereby it is natural to bring up a problem with a stranger. However, NASA people seeking ideas should be prepared to do so if occasions occur. Often, a new slant is available this way.
9. Users	Talk to users of products or services in field of interest to get ideas.			•	This method is more useful for checking or expanding existing ideas than for getting new ones. However, by revealing problems, it can provide the bases for new ideas. Such ideas are likely to be real rather than blue-sky types. A third party experienced in this type of activity should do this for NASA.
10. General public	Survey the general public to get ideas.			•	A survey of the general public is best for consumer products or subjects of general interest. It is doubtful if this method would elicit useful ideas for the shuttle service.
11. Creditors	Talk to creditors to get ideas.			•	This is not pertinent to the NASA situation.
12. Bankers	Talk to bankers to get ideas.			•	This is not pertinent to NASA.

TABLE 8. METHODS FOR IDENTIFYING NEW PRODUCTS, SERVICES, AND APPLICATIONS (Continued)

Subject	Description	NASA Only	Either NASA or Others	Others Only	Comments
<b>C. Group Creativity Methods</b>					
1. <u>Brainstorming</u>					This method requires limited experience in leading a group-easily learned rules. Results are generally good. Yields many ideas quickly. Generally not highly imaginative ideas, but rather practical. Can be difficult to get good groups together. NASA should try this system since it is cheap and effective, and NASA has the diversity of people to make it go. Among the five types listed:
a. Common	A group of half-a-dozen or so people is assembled and presented with guidelines. They offer ideas at random within the guidelines. No analysis is allowed.		•		a. Common is the easiest to do and yield good results with good people
b. Step-by-step	A group is given guidelines in parts every once-in-awhile during the session.		•		b. Step-by step, keeps the session going if it lags, and can change the viewpoint to get a different type of ideas.
c. Analytical	A group is asked to analyze ideas as the session progresses.	•			c. Analytical is good for a specific field where developed ideas are sought rather than raw ideas. It is also useful for further developing ideas already in hand.
d. Subgroup	A large group is given guidelines. Then breaks up into subgroups for brainstorming. Then breaks up for more brainstorming, etc.		•		d. Subgroup is useful for interchange among a large group of people with actual idea generation done by smaller, manageable groups. It can result in a more comprehensive list.
e. Creative people	A group is put together from known creative-type people. A common or other type of brainstorming is used to get ideas		•		e. Creative people is one using using selected people known for their ability to come up with lots of ideas. If such people are available, ideas can be gotten quicker than with run-of-the-mill people.
2. <u>Brainwriting</u>					Brainwriting is more difficult to conduct than brainstorming. Group members often resist writing, they'd rather talk. Easy to lose interchange values. Advantage is it can yield more ideas in given time than brainstorming. Ideas may be more mundane. NASA should try in conjunction with brainstorming since it is cheap and can be effective, and perhaps technical types at NASA would rather write than talk. The three types listed are examples of variations:
a. Pass-on	A group is given guidelines. Each participant writes down few ideas. Passes on list and each adds few more, etc.		•		a. Pass-on is easy for the group leader. It offers less breadth of thought than the Pool Exchange method because only ideas of the one group are included.
b. Pool exchange	A pool of several lists of ideas is provided for a group. Each participant writes down a few ideas. Then exchanges for a pool list and adds some, etc.		•		b. The leader must prepare lists of ideas ahead of time to stock the pool. Since these ideas are from outside the group, there is a greater cross-fertilization for thinking.
c. Delphi	A group is not necessarily physically together. Ideas from each are incorporated in a list. Distributed to all for additions or analysis. Repeated as necessary.		•		c. Delphi is basically a method for analysis and synthesis rather than an idea generation method. However, it can be useful to get ideas. It can be done by mail or circulation of a document in an organization. It has the disadvantage of requiring days or even months to complete. Also, it can bog down if people aren't reminded.

TABLE 8. METHODS FOR IDENTIFYING NEW PRODUCTS, SERVICES, AND APPLICATIONS (Continued)

Subject	Description	Either NASA or Others		Comments
		NASA Only	Others Only	
3. <u>Synectics</u>	<p>The intent is to force conscious efforts that bring into play subconscious creative processes. This includes 4 major steps:</p> <ol style="list-style-type: none"> <li>(1) Intensive consideration of the problem</li> <li>(2) Disassociation from the problem</li> <li>(3) Subconscious consideration of the problem</li> <li>(4) Bringing subconscious solutions to the conscious level.</li> </ol>			<p>The major advantage of all the synectics methods is that they can provide more imaginative ideas than other group methods. However, they give less ideas per unit of time, may give less practical ideas, and are more successful for highly specific problems than for broad areas.</p>
a. Analogy method	<p>Form a group. Go thru following steps.</p> <ol style="list-style-type: none"> <li>(1) Present problems, discuss it, and come up with ideas as in brainstorming. Make sure problem is understood by all.</li> <li>(2) Form an analogy to the problem (Maybe from nature)</li> <li>(3) Participants relate personally to analogy and tell how they feel, think, etc.</li> <li>(4) Form an internally conflicting analogy (such as wet dryness, windy calm, etc.)</li> <li>(5) Find real analogies for the contradictions (such as a Marks-A-Lot marker is wet dryness)</li> <li>(6) Select an analogy from (5) above and outline its attributes</li> <li>(7) Get ideas triggered by the description of (6) above.</li> </ol>			<ul style="list-style-type: none"> <li>This method requires extensive preparation by leader. Also, sessions must be 2 or 3 hours long. Yield per manhour generally low. But highly imaginative results are possible. Thus, for problems where completely new or novel answers are desired, the method is great. For such situations, it could be worthwhile for NASA to learn to use this method or the following methods. However, it would be more efficient to have it done by a third party experienced in the techniques.</li> </ul>
b. Story method	As the analogy method above, but substitute story telling for steps (2) thru (5).			<ul style="list-style-type: none"> <li>This story method is quicker and easier to use than the analogy method. A story is used as a basis for analogies. Ideas are not as imaginative as by the longer analogy method.</li> </ul>
c. Picture method	As analogy method, but use pictures and discussions of them for steps (2) thru (5).			<ul style="list-style-type: none"> <li>This method uses a picture and discussion of the picture. Otherwise it is similar to the story method.</li> </ul>
d. Word association	As analogy method, but use random word pairs for steps (2) thru (5).			<ul style="list-style-type: none"> <li>Random noun/noun or noun/verb word pairs are used. It is similar to the story and picture methods, but perhaps more effective.</li> </ul>
e. Contest	As analogy method, but divide group into teams. Take turns making up wild analogies and other team must solve in few minutes. Substitute for steps (2) thru (5).			<ul style="list-style-type: none"> <li>This adds the fun and excitement of a contest. Similar to above 3 methods, but more time consuming.</li> </ul>
(Note: There are many possible variations of these methods. The key element is methods to disassociate the groups' thinking from the problem for a time and then bring it back to the problem.)				

TABLE 8. METHODS FOR IDENTIFYING NEW PRODUCTS, SERVICES, AND APPLICATIONS (Continued)

Subject	Description	NASA Only	Either NASA or Others	Others Only	Comments
4. <u>Other Group Methods</u>					
a. Incentives	Use rewards (or punishments) to encourage ideas from groups		•		Rewards and punishments for participants have been used primarily with housewife groups. It is probably not useful for NASA.
b. Challenges and obstacles	Provide challenges or obstacles to groups to get them to come up with ideas		•		This method can be effective with scientists and engineers who generally like to be challenged or presented with obstacles. Often the only challenge needed is for the leader to say, "This area is impossible to get ideas in, but maybe we can develop one or two". NASA should try this method.
c. Flash cards	Use flash cards with groups to stimulate ideas		•		Flash cards with words or pictures for fractions of seconds as session progresses to distract and stimulate participants. Marginal value for NASA.
d. Charades	Play charades to get ideas		•		Charades game is used as background for idea session. May or may not be related to ideas wanted. Marginal for NASA.
e. Twenty questions	Play Twenty Questions to get ideas		•		Marginal for NASA.
f. Mismatch definitions	Mismatch definitions of things to stimulate ideas		•		This can lead to unusual ideas. Should be tried by NASA--probably through a third party familiar with the technique.
g. Role playing	Play roles in order to come up with ideas		•		This is recommended for NASA--through a third party.

TABLE 8. METHODS FOR IDENTIFYING NEW PRODUCTS, SERVICES, AND APPLICATIONS (Continued)

Subject	Description	Either NASA or Others		Comments
		NASA Only	Others Only	
D. <u>Analytical Methods</u>				These methods of getting ideas can be excellent if properly used--and they are difficult to use. Their main value is that they use real events or problems as the basis for ideas. Thus, the ideas tend to be high quality. It is expected that they will be especially hard to use for the space shuttle service since the events and problems that influence it can be in any area. NASA should probably use a third party in the application of these methods.
1. <u>Relevance and other trees</u>				
a. Perspective or horizontal relevance trees	Construct a diagram (tree) of boxes. Put in the boxes such factors as resources, technologies, utilities, environmental information, markets, etc., at various levels of specificity. Look for changes dependent on other changes, unfilled boxes, etc., to trigger ideas.		•	The perspectives tree starts with the factors that can influence a situation. It can be difficult to visualize all of these. But as they are put down and organized, others are usually suggested. Once the tree is constructed, voids and the consequences of assumed changes can sometimes be obvious, but also not so obvious. A lot of time is required to do the job well.
b. Objectives trees	Construct a diagram. Put objectives in one box. Put various levels of subobjectives needed to reach objectives in others--step-by-step. Look for voids to trigger ideas.		•	These trees are usually easier to construct if one knows one's objectives. It is probably a less useful method than perspectives trees since it is more inward looking than outward looking. Thus, the results may not fit the market environment too well.
c. Reverse objective trees	Construct a diagram. Build from some base of subobjectives thru various levels to objectives. Use objectives to trigger ideas.		•	This method is handy to develop overall objectives from lower level objectives. Once completed, it is like a straight objectives tree for getting ideas.
d. Fault trees	Construct a diagram. Put an event in one box. Put reasons and what could go wrong, and secondary, tertiary, etc., reasons and what could go wrong in boxes at several levels leading to event. Look for ideas among the reasons and what-could-go-wrong boxes.		•	This method is perhaps most useful to evaluate or expand existing ideas. It provides a check on the validity of an idea. It also can suggest ideas.
e. Decision trees	Construct a diagram. Specify alternatives. Specify results of alternatives. Continue chain. Look for ideas based on the network.		•	This is perhaps the most difficult tree to construct. It is based on specifying possible alternatives and then results of such decisions. Then additional decisions and their results. Etc. From this exercise, one can then derive ideas. Probably not useful to NASA--better to use objectives tree instead.
f. Branchless tree	Construct a diagram of several levels without boxes. Put parallel degrees of specificity on common levels. Look for voids contradictions, etc., to suggest ideas.		•	This is a method of constructing any kind of tree. It substitutes levels with several items for specific items directly related to specific other items. It is usually easier to construct and can be just as useful for getting ideas. However, it is less useful as an analysis tool than regular branched trees.
2. <u>Matrixes</u>				
a. Morphological boxes	Draw a matrix. Specify a few elements of a (function, generic ways-to-do, etc.) subject and put these as headings for the axes. Look at each cell to see if there are voids that lead to ideas. Can do in three dimensions also. Or can repeat for more dimensions.		•	Matrixes are useful for triggering ideas by displaying paired variables--often unrelated or unusual pairs. Some of the variables of interest in looking at the shuttle services might be gross weight, payload, distance, velocity, elapsed time, lead time, etc. Matrixes are not easy to use, but should be tried by NASA.

TABLE 8. METHODS FOR IDENTIFYING NEW PRODUCTS, SERVICES, AND APPLICATIONS (Continued)

Subject	Description	NASA Only	Either NASA or Others	Others Only	Comments
<u>3. Scenarios</u>	Develop a situation based on assumptions or hypotheses. Speculate the consequences of the assumptions. Use these to trigger ideas.				Scenarios are difficult to construct to relate to a field of interest. With no existing base as a point of departure as with the shuttle service, it is even harder to use. Possible procedures are to write a science-fiction scenario or answer questions concerning what is needed and why. If a scenario is done, it predicts events and provides thought patterns that can trigger ideas.
a. Descriptive	As above with the present situation as the base.		•		With no existing shuttle service, this may be impossible to do.
b. Extrapolative	As above with the future projected from the past as the base.		•		With no past to project from, this is impossible for shuttle service.
c. Normative	As above with the future estimated or speculated, rather than projected from past, as the base.			•	This could be used for the shuttle service since the future is speculated without necessarily considering the past or present.
<u>4. Forecasting</u>					Forecasting is one part of scenarios. Some types can be used by NASA for the shuttle service. One asks what is needed when future events (real or speculated) occur. Some types of forecasting should be used by NASA since future needs are usually different than past and current needs.
a. Historical projections	Extrapolate a time series of data. Use the trend or quantity in future as a guide to expected needs and ideas to fill the needs.		•		Impossible for shuttle service which does not exist so has no past.
b. Applications analysis	Break a market into major applications. Forecast these. Use the future expectation as a guide to ideas.			•	For the shuttle service, this is best used in areas identified by some other idea generation method. It can result in new or more specific ideas.
c. Normative forecasting	Set goals. Specify actions to reach goals (step and substeps). Make as realistic as possible by checking and changing. Review actions to trigger ideas.		•		This simplified version of normative scenarios should be combined with applications forecasting for the shuttle service. Thus, both market and supplier aspects of situation are covered.
d. Correlation	Correlate an unknown with a more easily predicted thing. Use indicated future of predicted as a guide to ideas.		•		Cannot be used for shuttle service since no historical data to use for correlation.
e. Game theory	Use mathematical techniques such as Bayesian, Monte Carlo, probability, etc., theories to estimate future. Use indicated trends as triggers for ideas.			•	This method seldom used. Not good for shuttle service.

TABLE 8. METHODS FOR IDENTIFYING NEW PRODUCTS, SERVICES, AND APPLICATIONS (Continued)

Subject	Description	NASA Only	Either NASA or Others	Others Only	Comments
5. <u>Analysis of Product (or service) line</u>					This method is a necessary part of investigations of shuttle services. Not so much as an initial way to get ideas, but as a continuing effort to redirect service design toward market needs as additional knowledge is gained. The analysis of the shuttle service must be related to applications and the market needs based on these applications. Avenues where the capabilities of the service cannot fulfill needs should be cut off or redirected. Cost/price factors should be included in the analysis, and where costs are higher than probable price, a cutoff is indicated. A third party should be called on by NASA in the product analysis methods to insure objectivity.
a. Completeness	Look for complementary or other products to round out existing line. May add to breadth of line, depth of line, or be complementary to line.			•	By analyzing the shuttle service for completeness, additional applications or service options may be found.
b. Materials or parts	Seek new products or services based on same or similar materials and parts as used in existing products.		•		This does not apply to shuttle service.
c. Manufacturing methods	Seek new products or services based on similar methods or equipment or labor as used to manufacture existing products.			•	This does not apply to shuttle service.
d. Markets	Seek new products or services purchased by customers now served.			•	This method is a good way to expand applications for the shuttle service. Since it depends on customers, it has no pertinence until the shuttle is in use.
e. Technology	Seek new products or services based on the technology on which existing products are based.		•		This may lead to ideas concerning the shuttle service. A broad range of technologies will be used in building and operating the shuttle service. An analysis of these may lead to ideas for applications of the service.
f. Marketing	Seek new products or services based on the channels of distribution, selling methods, credit arrangements, and other marketing methods used for existing products.			•	This does not apply to the shuttle service now since it is not being marketed.
g. Competition	Analyze product lines of competitors to find products missing from own line.			•	This applies indirectly to the shuttle service. An analysis of methods now used to accomplish various activities may lead to ideas of how the shuttle service can replace or supplement these methods.

TABLE 8. METHODS FOR IDENTIFYING NEW PRODUCTS, SERVICES, AND APPLICATIONS (Continued)

Subject	Description	NASA Only	Either NASA or Others	Others Only	Comments
5. <u>Technology Analysis</u>					Analysis of technologies is an essential part of getting ideas for the shuttle service. It is basic to know where the best potential applications are, and the design of the service to serve these applications. Unfortunately, is difficult and costly to do. Not only is it difficult to itemize and organize the various technologies and their status and trends, but it is even more difficult to interpret the major obstacles and problems where a shuttle service might fill a need. Aid from a third party should be included by NASA.
a. Materials developments	Review what is being developed or changed in materials or what new uses are proposed for materials. Speculate product or service or applications ideas from these.			•	Materials technology could be extremely important to NASA shuttle services because the processing requirements are often unusual, new properties can be achieved by novel processing methods, and a number of materials are priced high enough to allow high processing costs.
b. R&D	Review R&D activities (from literature, meetings, friends, personal knowledge, etc.) Include basic, applied, etc. Speculate from these how technology might change. Use as guide to ideas.			•	R&D activities are usually not bound by the tight economic constraints of manufacturing. A company can afford very high R & D costs if they result in better products or lower production costs. Thus, R & D activities are prime candidates for the shuttle service. Finding the R & D areas that will provide ideas for shuttle applications and services will be time consuming and difficult.
c. Phenomena	Review present situation and trends in natural phenomena (physical, chemical, biological, etc.). Speculate new things from this review.			•	This is perhaps the easiest technology analysis to do. However, it is more likely to result in no more than ideas for where to look for more specific ideas, rather than final answers. For this purpose, it can be an excellent first step for NASA in looking for applications for the space shuttle service. Following steps can then be guided by these results.
d. Voids and barriers	Review technologies to find voids and barriers. Use these to suggest ideas.			•	This method requires considerable skill, but can be done quicker and at lower cost than most of the other technology analyses. It concentrates on problems and obstacles rather than a comprehensive review of technology. A third party with a broad technology background can help NASA here.
e. Mathematics	Review various fields of math. Use the facts, methods, theories, etc., to trigger ideas.			•	This method is seldom used and is not useful for the shuttle service situation.

TABLE 8. METHODS FOR IDENTIFYING NEW PRODUCTS, SERVICES, AND APPLICATIONS (Continued)

Subject	Description	Either NASA or Others		Comments
		NASA Only	Others Only	
7. <u>Environmental Analysis</u>				<p>Analysis of the environment in which a company must operate is highly important to continued success of a business. Yet this is the most difficult type of analysis. There are so many factors, related in so many known and unknown ways that it is almost overwhelming to contemplate. Fortunately, simplification is possible and can yield satisfactory results for initial design and operation of a shuttle service. Additional analyses can be done over a period of time to provide a base for improving and expanding the NASA service. An experienced third party is essential to help NASA with these methods.</p>
a. Social	Review social changes, trends, events. Use to suggest ideas.			<ul style="list-style-type: none"> <li>This is the basis of all else. Other activities and institutions exist because society wants them. Social change is often irrational, whimsical, seemingly impossible, since people are irrational. Fortunately, inertia slows down changes and provides for major trends that can suggest ideas.</li> </ul>
b. Economic	Review economic changes, trends, events. Use to trigger ideas.			<ul style="list-style-type: none"> <li>Economics is only one level down from social as a basis for things. It is much more rational and easier to analyze. It is a great driving force for many events and thus can be used to suggest ideas--especially related to businesses that might be customer for the NASA shuttle.</li> </ul>
c. Political	Review political changes, trends, legislation, events. Use to trigger ideas.			<ul style="list-style-type: none"> <li>Politics will of course, influence government markets for the shuttle service. In addition, they have influence on non-government markets. Since politics can often be irrational or appear to be irrational, it is more difficult to derive usable ideas from political factors.</li> </ul>
d. International	Review international situation and use to suggest ideas.			<ul style="list-style-type: none"> <li>The international situation can suggest ideas through comparisons of countries, trade, and communication problems, and the like.</li> </ul>
e. Cultural	Investigate various cultures as sources of ideas.			<ul style="list-style-type: none"> <li>Analysis of a variety of cultures can provide different viewpoints that can result in unusual ideas.</li> </ul>
f. Language	Analyze various languages to suggest ideas.			<ul style="list-style-type: none"> <li>This is not a worthwhile method for NASA.</li> </ul>
g. Fads	Investigate various fads as basis for ideas.			<ul style="list-style-type: none"> <li>Fads can have a far-reaching effect on business operations--both favorable and unfavorable. A simple fad can quickly make or break a company. This method should be included as an idea source for the NASA shuttle service.</li> </ul>
h. Evolution	Analyze evolutions of humanity, civilizations, etc., as sources of ideas.			<ul style="list-style-type: none"> <li>Evolution analysis can show patterns that trigger ideas. It is not, however, a necessary part of a NASA search for ideas.</li> </ul>

TABLE 8. METHODS FOR IDENTIFYING NEW PRODUCTS, SERVICES, AND APPLICATIONS (Continued)

Subject	Description	NASA Only	Either NASA or Others	Others Only	Comments
<u>Environmental Analysis</u> (Continued)					
i. Physical world	Investigate physical things, events, etc., to suggest ideas.		•		An analysis of major aspects of the physical world--land masses, mountains, rivers, etc.--may suggest ideas. But it is probably not needed as a method for getting ideas for the shuttle service.
j. Astronomical	Look at the planets, stars, galaxies, etc., as basis for ideas.		•		This methods suggests itself because of NASA interest in space. It is a most uncommon method in normal practice.
E. Miscellaneous Methods					
1. Creation	Think about a subject to try to get new ideas.		•		Creation of ideas by an individual is tough to do at will. Some people are highly creative and can do it, but most people cannot do it on demand. Ideas of creative individuals at NASA should be noted.
a. Stimulated	Use alcohol, drugs, or other stimulants to encourage creation.		•		This can increase the creativity of some people. It is not recommended for NASA.
2. Observation	Look at things as a stimulant to thinking of new ideas. For example, store displays, air terminal displays, etc.		•		Observation of the world around one can stimulate creation. However, it is an erratic process, sometimes working, sometimes not. NASA people seeking ideas should be conscious of the method and use it as the occasion indicates.
3. Subconscious	Dream of ideas during natural or induced sleep.		•		This can provide highly imaginative ideas by some people, but cannot be called forth as wanted. Not recommended for NASA.
4. Hypothesization	Make up hypotheses and use them to trigger ideas.		•		For scientists and engineers, this can be effective. Should be great for NASA.
5. Disassociation	Disassociate with reality to trigger ideas.			•	This is tough for most people--especially for technical types. However, some of the techniques shown under Group Methods can be used by an individual and should be tried by NASA.
6. Daydreaming	Daydream to come up with ideas.		•		It is hard to force daydreams that create ideas. No special attention by NASA is indicated.
7. Plant tours	Take factory or other tours to suggest ideas.		•		This is an excellent way to get ideas. But it is considerable trouble to do. Recommended highly for NASA.

methods. Within these five major headings, 144 specific methods were identified, 65 of which were deemed to have direct, useful application to STS.

In examining those methods which were deemed applicable it can be seen that many are interdependent and differ only slightly in the method of implementation. Nevertheless, most, if not all, of the approaches should be considered and probably used in a well-functioning organization whose main objective is new idea generation or identification. To initiate activity, however, it would appear that efforts should be concentrated on group creativity methods and people source methods.

Of the group creativity methods, brainstorming, brainwriting, and synetics offer the best potential. These methods are used quite effectively throughout industry. Battelle has found them to be particularly useful where totally new ideas are desired. These activities can and should be done both internally and externally to the NASA organization and its contractors. When used externally, the best implementation route is through selected use of technical societies and trade associations. This should be particularly useful for STS because of the broad potential applications it offers. Very careful planning and implementation are necessary if such an approach is to yield successful results. This is best done by people experienced in using these techniques.

For initial efforts, meetings represent the best of the people source methods. Trade shows, technical society meetings, and trade association meetings are potential sources of ideas. Participation should be both active and passive; i.e., presenting papers, and obtaining feedback on the one hand, while just observing and listening on the other. This approach requires specially trained people to be most effective. The participants must be creative, think very broadly, and communicate very well. They must be able to correlate and analyze what may be apparently unrelated facts, products, or ideas.

As the new use function gathers momentum, all of the techniques identified will probably be employed. This will require a significant application of manpower when one considers the multitude of potential uses which might be conceived. A major problem which was not included

in the scope of this study is "how do you discern good ideas from bad ideas?" Screening methods will need to be established which can realistically sort out the good ideas. Surprisingly enough, industry has not been very successful in formalizing screening efforts and it can be anticipated that NASA will encounter a great deal of difficulty here. For example, there are generally six stages in industrial new-product process: idea generation, screening, business analysis, development, testing, and commercialization. Figure 2<sup>(1)</sup> shows a typical distribution of the mortality of new-product ideas by these stages. Note that 80 percent of the ideas never make it out of the screening stage. This shows how difficult it is to get ideas which even justify going into business analysis, let alone development. NASA will find the screening step for industrial applications very difficult to accomplish because every organization uses different criteria and weighting factors in the screening process.

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(1) Handbook of Modern Marketing, Edited by V. P. Buell, McGraw-Hill Book Company, New York (1970), "Managing New-Product Development" (C. Jones and R. F. Sherman) p 3-56.

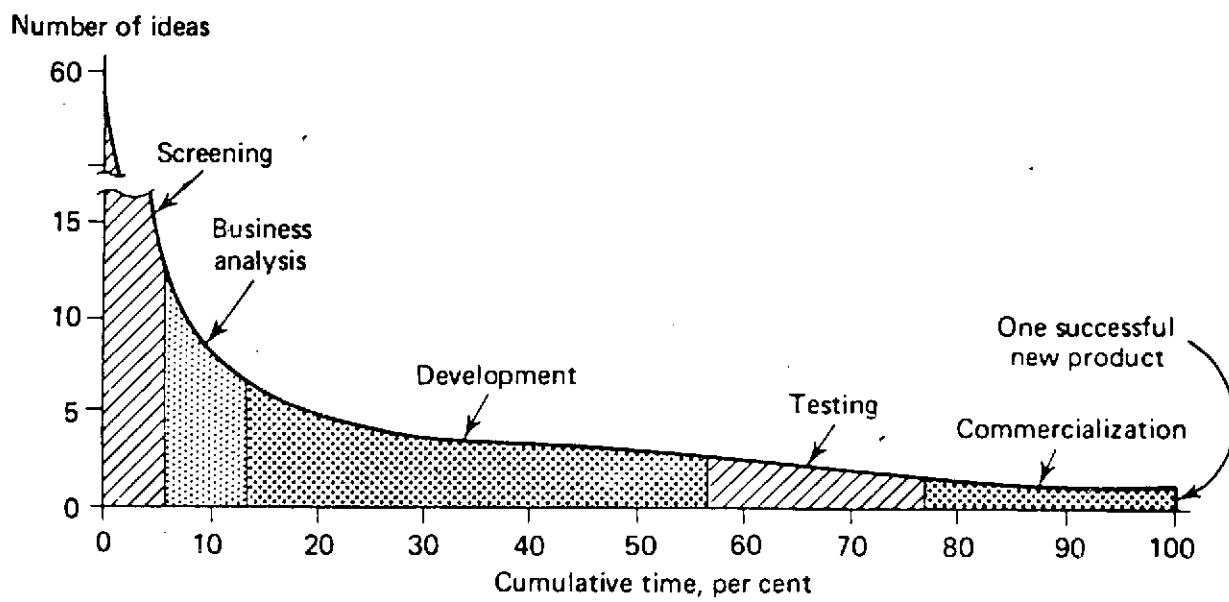


FIGURE 2. MORTALITY OF NEW-PRODUCT IDEAS BY STAGES OF EVOLUTION

TASK III - ANALYSIS OF APPROACHES FOR OBTAINING  
NEW USERS FOR STS IN INDUSTRY

Objective

The objective of Task III was to identify all methods which might be employed in obtaining new industrial users for STS.

Procedure

Obtaining new users for STS is actually the same type of problem industry has in marketing its products. It, therefore, is reasonable to assume that many of the methods and techniques used by industry should be applicable to the STS. Therefore, specialists in the field of industrial marketing prepared a detailed listing and brief description of marketing methods used by industry. The listing was intended to be a primer for use in structuring organizational approaches to new user development. Comments were prepared regarding how these methods are used and their relative strengths and weaknesses. Finally, an analysis and judgements were made regarding whether each technique was applicable to NASA and the STS. These subjective judgements represented the conclusion of a committee of three specialists. Table 9 presents the input-output relationship in Task III.

Discussion of Results

The results of the identification and analysis efforts of marketing methods are presented in Table 10. Six major approaches to industrial marketing were identified. These included: (1) personal direct, (2) personal indirect (middleman), (3) impersonal, (4) groups, (5) incentive, and (6) miscellaneous. Within these six major approaches, 97 specific methods were identified, 46 of which were deemed to have direct, useful application to STS. In general each of these approaches will eventually be used if satisfactory user involvement is to be

TABLE 9. INPUT-OUTPUT DATA RELATIONSHIPS FOR TASK III



<u>INPUT</u>		<u>ACTIVITY</u>		<u>OUTPUT</u>
RELATED EXPERIENCE OF INDUSTRIAL AND CONTRACT RESEARCH ORGANIZATIONS IN MARKETING NEW IDEAS OR PRODUCTS		DEVELOP A LISTING AND DESCRIPTION OF ALL METHODS USED BY INDUSTRY FOR MARKETING. APPLY EXPERIENCE OF SPECIALISTS TO ESTABLISH THE VALUE OF THESE METHODS FOR NASA AND STS		<ul style="list-style-type: none"> <li>• A PRIMER OF TECHNIQUES FOR INDUSTRIAL MARKETING FOR USE BY NONSPECIALISTS</li> <li>• AN ANALYSIS OF THE RELATIVE STRENGTHS AS RELATED TO THE STS</li> <li>• THE RESULTANT DATA TO BE USED IN TASK VI – DEVELOPMENT OF RECOMMENDED STRATEGIES</li> </ul>

TABLE 10. METHODS FOR MARKETING PRODUCTS AND SERVICES

Subject	Description	Applies to NASA	Does Not Apply to NASA	Comments
<b>A. Personal Direct</b>				
1. Direct salesmen				
a. Door-to-door	Salesmen (women) are trained in sales techniques, assigned a territory and contact as many persons in the assigned area as possible.	•	•	This method is used for consumer products (and services) since it involves calling on the housewife at her home. It has the advantage of direct personal contact with the prospective buyer. It also shows selection of income class that are best prospects. It is limited to easily understood products for which demand already exists. Also, it can be expensive.
b. Industrial	Salesmen are given rather extensive training in product specifications and assigned territories and specific companies. Contacts are made to purchasing agents, engineers, executives, etc., as necessary.	•		This method is extensively used to sell industrial products. It allows the seller to select its prospects, but requires effort to determine who the real buyers are within the prospect company. It allows the salesman to establish a continuing relationship with the buyer and to understand his needs. It is especially valuable where the product is complex, requiring interchange and feedback between seller and buyer.
c. Company executive sales	Executives determine potential customers and the proper level to make contact. Sale could occur at meetings, banquets, golf course, on planes, etc.	•		This method is used where a sale is highly important - a big sale, an important customer, a dissatisfied customer, etc. It allows on-the-spot decisions by the seller. It can build an image for the seller. But it can be costly, can get out of hand, and require too much executive time, or it can get lower levels of personnel and if handled poorly.
d. Pyramid organization	One person interests several others who each interest several others, etc. Incentives are built in to have a large number of contacts continue the effort.	•	•	This method is used to quickly build large, low-investment sales forces for selling products directly to housewives. It is based on the fact that the more salesman, the more sales. It has a service shortcoming that the salesmen are not well prepared so can sell only simple or emotional appeal items.
2. Non Face-to-face				
a. Telephone	Salesmen are given a list of contacts and a written approach. Interested contacts are referred to a face-to-face salesman.	•		This method is used primarily for specific functions - cold canvassing, screening mail or other referral leads, order taking, for routine products to established customers. It is low cost but not very effective for actually selling. It is somewhat impersonal and it is difficult to judge the reactions of the prospective buyers. Its main value for NASA would be for arranging personnel contacts, answering questions and other auxiliary functions.
b. Personal letter	Letters are mailed to potential contacts. Those that respond are visited.	•		This method is cheap. It can familiarize prospective buyers with the seller and its products, generate lists of interested prospects, provide reorder capabilities, or even sell standard products. It can also provide a continuing contact between buyer and seller. Building a good mailing list can be a problem.
3. Stores				
a. Retail	Sales personnel interface with mostly walk-ins. Minimal sales training is given on specifications.	•	•	This method is used to mass-merchandise consumer goods. It is a standard, well-understood, well-organized marketing channel. It allows some freedom for the seller to select buyer groups by major characteristics. It does not allow selling of complex items since sales personnel are not well trained concerning the many products they sell. Sales costs are pretty well known ahead of time but are fairly high. Also the supplier is at mercy of retailer concerning how product is sold to buyer.
b. Office or catalog sales	Examples of products are kept in a convenient place for viewing by interested persons. Contacts are made by a variety of means.	•		This method allows consumers or industrial buyers to see a few products and look at others in catalogs. It is not a widely used method.
c. Discount house	Private brand, large order discounts, reduced specifications, etc., allow reduced price at low overhead self-service stores.	•		This method is a special case of retail stores. Less customer service is offered, high-turnover items are stocked, self-service is common, often no credit or delivery is provided. It is a mass outlet for goods.

TABLE 10. METHODS FOR MARKETING PRODUCTS AND SERVICES (Continued)

Subject	Description	Applies to NASA	Does Not Apply to NASA	Comments
4. Demonstration	Customers are contacted by a variety of means to allow direct salesmen in to office, home, etc., to demonstrate product. Techniques used are (a) no obligation for visit, (b) upgrading during visit, (c) limited time discount offer.	•		This method is used for either consumer or industrial goods. For products with complex or unusual features it aids in putting story across to prospective buyer. Models can be used to demonstrate. It has the disadvantages of taking a considerable amount of time and effort, requiring a skilled demonstrator, and sometimes being difficult to transport and set up the demonstration.
B. <u>Personal Indirect</u> (Middlemen)	Stand between producer and consumer and receive profit for functions performed.			Middlemen are used for a number of reasons: (1) To assemble goods from a number of manufacturers, (2) to provide local warehousing and quicker delivery, (3) to provide knowledge of markets, (4) to provide larger unit sales for manufacturers, (5) to provide a sales force, (6) to provide a market image or position, (7) to reduce cost and risk of marketing, and a number of other reasons. Not all middlemen provide all services or are used for the same reasons.
1. Merchant	Buys goods and take title.		•	Merchant middlemen generally provide a greater variety of services for suppliers and customers than other types. Since they take title to products, they assume some of the risks of manufacturers. Since they do best with rather standard products, they are not useful for marketing the shuttle.
a. Wholesaler	Buys large quantities, stocks large variety and provides delivery, warehousing, and obsolescence pickup. May handle local advertising and extend credit.		•	Wholesalers generally provide a complete range of services for manufacturers and customers. They predominate in areas where there are a large variety of products from many manufacturers.
b. Distributor	Represents a few or large number of companies. May or may not be franchised. Usually has a territory.		•	Distributors often have many of the attributes of wholesalers. They are generally used for nonconsumer products - especially supply-type items like hardware and other frequently purchased items.
c. Jobber	May perform tasks of wholesaler or may interface between wholesaler and consumer. May be smaller, private business.		•	Jobbers are generally more specialized in function or product line than wholesalers. They are usually found in consumer goods or a specialized industrial products area.
d. Importer	Buys products or services in a foreign country and resells in own country.		•	The importer can provide some or all the functions of a wholesaler. However, his suppliers are foreign sources.
e. Exporter	Buys products or services in own country and resells in a foreign country.		•	The exporter usually is more limited in functions than a wholesaler, but may be broader in product line. He provides a central source of supply for importers or other large buyers in other countries.
f. Wagon distributor	Buys products, stocks in a truck or other vehicle, and drives about selling the products at the customers' homes or offices.		•	This minor middleman usually handles perishable products. He seldom offers services beyond quick availability at the customer's location.
g. Desk jobber	Buys and resells without physically handling the product or service involved. (Also known as a drop shipper.)		•	The desk jobber buys and sells, and often offers credit. He does no physical handling of the products so has low costs. He can provide quick, low-cost delivery - but usually only in large lots.

TABLE 10. METHODS FOR MARKETING PRODUCTS AND SERVICES (Continued)

Subject	Description	Applies to NASA	Does Not Apply to NASA	Comments
<b>B. Personal Indirect (Continued)</b>				
2. Functional	Does not take title to goods.			Functional or agent middlemen provide less services than merchant middlemen. Since they are agents of other companies, they often have limited freedom to negotiate. However, in this respect as well as other functions, the different types cover a broad range of methods of operation.
a. Broker	Usually acts as agent in transfer of title for producer. May specialize in specific products or commodities. Normally doesn't have possession of product.	•		Brokers usually specialize in a fairly narrow product field. They locate sources or buyers of standard products. They are usually experts concerning current conditions in the field they operate in. They rarely physically handle the item they buy and sell.
b. Sales agent	Usually represents one to many companies' product line, usually noncompeting. Territory may be unrestricted. Has sales responsibility, can specify price and style.	•		The sales agent is put under contract by one or more companies to act as a sales force for these suppliers. He can supply a full range of services. He nearly always has freedom to set prices for his suppliers. He may represent competing manufacturers. Thus, delicate situations can arise.
c. Manufacturer's representative	Represent one to several product lines, usually related. May also be technically competent. Helps solve customers's problems. Has limited assigned territory, price and terms of sale responsibility.	•		The manufacturer's representative acts as an agent for a number of manufacturers to sell their products in a given industry or geographical region. He offers many of the services of the sales agent but usually does not set prices, and usually handles more competitive lines. He is a quickly obtainable sales force for a new manufacturer.
d. Commission house	Similar to Broker, but does have possession of product. Makes delivery and extends credit.	•		The commission house has greater freedom to negotiate prices than the broker. He also physically handles the products, and may even offer credit. He has similar advantages to those of brokers - mainly intimate knowledge of market conditions.
3. Other				
a. Consultants	Usually sell personal experience to assist in sale of products. Normally, are individuals or small groups.	•		Marketing consultants provide a variety of investigative and advisory services to suppliers of products and services. They normally do not actually do marketing - but participate only as advisors. However, in the selling and buying of complex products or services, they may help get buyer and seller together and provide advice during the marketing efforts. Consultants could be valuable, if not essential, to NASA in marketing its service.
b. Lobbyists	Usually sells a service based on personal knowledge or influence. May represent a company or an industry. Included are individuals, groups, and some trade associations. They provide information to press, legislators, government agencies, etc.	•		Lobbyists are middlemen in a broad sense since they market a company, industry, or other group to legislators and government agencies. The purpose is to gain an advantage for the interests they represent - usually by favorable legislation or regulations. Their strength is knowledge of their "market" and how to influence it. Lobbyists may be useful to NASA in making it easier to market the shuttle - especially if there are laws or regulations that restrict NASA's marketing freedom.

TABLE 10. METHODS FOR MARKETING PRODUCTS AND SERVICES (Continued)

Subject	Description	Applies to NASA	Does Not Apply to NASA	Comments
<b>C. Impersonal</b>				
<b>1. Mail</b>				
a. Catalog	Wide or limited product catalogs are mailed broadly or selectively to potential customers. Order blanks are included and sometimes credit extended. Warehouses may be used.	•		This method is used for consumer products and standard industrial products. It has the advantages of being low cost, allowing the buyer to decide at leisure, providing information on a large number of products giving precise specifications, and often reaching the purchasing influence individuals. It has disadvantages of having no personal persuasion, no reaction to buyer questions or attitudes, and providing no help to the buyer in taking care of purchasing details. It is not useful for custom services.
b. Direct mail	Individual company sells directly to consumer without wholesaler, etc.	•		The major advantages of direct mail are relatively low-cost, rather precise selectivity of buyers, and frequency of contact. It lacks the personal human touches. Its main usefulness for NASA would be as a continuing reminder of the status of the shuttle when used in conjunction with more appropriate personal sales methods.
c. Trade literature	Mailings are included on a regular basis along with literature of other companies or products. Can also be as ads in trade and technical magazines.	•		Literature request cards returned from trade magazines provide a mailing list that reflects some interest by prospective buyers. The material mailed can be tailored roughly to the industry or needs of the requester. It is particularly useful as the initial stage in building a good list of prospective customers at relatively low cost.
d. Specification circulation	Specifications of potential products are circulated to a wide variety of potential customers to determine new uses and possible markets.	•		This method is used to interest potential users of a new item in the item, and to get ideas for applications from these users. It is used mostly where a new item may have hard to determine applications - such as a new chemical intermediate. Usually the new item will not be commercially available for quite some time in the future. It could be useful to NASA in getting industry to start thinking about the shuttle service.
e. Return coupon	Additional information is mailed to those who return the coupon. Coupon can be in trade press, technical press, direct mail, etc. Lists of potential customers are compiled from returned coupons.	•		This method is similar to the trade literature method, but coupons are in ads, and are returned directly to advertiser rather than to the publisher of the magazine. It will generally provide fewer, but higher quality, responses than the trade literature method.
<b>2. Advertising</b>				
a. Mass media	Radio, T.V. newspapers, etc. are used as media to contact public. Company staff, ad agencies, etc., may develop program and format for specific ads.	•		This is by far the largest method of advertising. The major advantage is very low cost per unit exposure. However, a large segment of the population must be potential customers or much of the advertising is wasted. Effectiveness is highly dependent on the design and content of the ad. It is probably the most effective method of creating demand for widely used consumer items. It is also used to build company images.
b. Bill board	Strategically placed boards are rented or owned. Displays may be by own staff or ad agency.	•		This method is effective to reach potential customers in a given geographical area, drivers of autos, and other special characteristics prospects that can be reached by physical location of messages. It is relatively low cost per unit exposure. The message must be very short and easily grasped.
c. Word-of-mouth	People tells others about a product or service.	•		This method is probably the most effective advertising method and has the lowest direct cost. However, it provides very limited coverage and takes many years to build. Little can be done to promote this method other than to be a good company and give good value in one's products or services.

TABLE 10. METHODS FOR MARKETING PRODUCTS AND SERVICES (Continued)

Subject	Description	Applies to NASA	Does Not Apply to NASA	Comments
2. Advertising (Continued)				
d. Ad agency	Single ads to total programs are developed by the agency either for a fee, retainer, or commission. Specialists are normally present on staff. Consumer reaction may also be evaluated.	•		Ad agencies are advertising, and often marketing, consultants. For a fee, they provide a complete range of services for an advertiser. They are especially valuable in ad design, selection of media, and advertising campaign planning. They provide professionalism in advertising that manufacturers cannot duplicate by themselves. NASA will need an agency to do effective advertising.
e. Specific audience	Selected media for very pointed ads are utilized to reach a selected audience.	•		The major media here are trade literature. The advertiser can reach the industry, type of person, or other category he wants to. Cost per unit exposure content and format of the ad must be good to attract attention from competitive ads. This method is the standard for advertising nonconsumer products and services, and should be important in NASA's shuttle advertising.
f. Handbills	Printed advertisements are passed out to homes and companies.	•		This method is used primarily for consumer items being advertised to households. It allows selection of geographical location very specifically. It is used primarily by local retailers.
3. Direct contact				
a. Vending machine	Products are displayed with opportunity for immediate purchase.	•		Vending machines provide 24-hour-a-day service. They are good for high-volume, standard consumer products that are purchased frequently. They have disadvantages of requiring coins, being subject to vandalism and robbery, being expensive to service, requiring good locations, and being subject to jamming.
4. Other				
a. Sample kit distribution	Samples or models of products are distributed to potential customers.	•		This is widely used for staple items such as soap, cereals, etc. It is also used for simple nonconsumer items such as drugs, fasteners, and plastic items. It has the advantage of involving the prospective buyer with the product. Its major disadvantage is its relatively high cost.
b. Articles and news items	Articles, planned news releases, etc., about products or services are sent to mass media or trade literature to be printed and read by potential buyers.	•		This method can be highly effective for familiarizing prospective buyers with new products, informing them about new uses, showing them the advantages of the product, etc. The cost is low. But the items must be well done if they are to be effective. It could be an excellent method for NASA to create interest in the shuttle service.
C. <u>Award Winning Ideas</u>				
	Submit product or ideas as entry in contest for award - e.g., Industrial Research Magazine products of year.	•		This accomplishes similar goals as articles and news items, with perhaps greater prestige. It requires a significant accomplishment if it is to have major impact on prospective buyers. It is another promising method for NASA to promote its shuttle service.

TABLE 10. METHODS FOR MARKETING PRODUCTS AND SERVICES (Continued)

Subject	Description	Applies to NASA	Does Not Apply to NASA	Comments
<b>D. Groups</b>				
1. Trade shows	Specific products are displayed to groups with special interest. Hospitality suites and booths are used.	•		Trade shows have strong advantages for marketing - a highly selected audience of prospective buyers, demonstration possibilities, a team of salesman. But they are costly and nonbuyers can take much time. Hot prospects can be invited to private rooms for special sales effort. The competition among booths to attract attention can be intense. Thus, booths should be carefully designed and set up to attract attention and put the message across. Trade shows are considered an excellent way for NASA to show the potential of the shuttle service.
2. Seminars	Selected individuals are invited to a closed meeting to present products.	•		Seminars have highly selected prospects in an environment selected by the seller. The sales pitch can be carefully designed and expertly presented. However, they can be expensive. NASA should use seminars as a key marketing method for the shuttle service.
3. Exhibit van	Representative products are arranged in a van which is driven to the potential customer's location.	•		Exhibit vans have many of the advantages of trade shows - selected prospects, demonstrations, expert team selling. But they are very expensive and time consuming. For reaching major potential customers they would be highly effective for NASA.
4. Sales parties	Individuals are compensated for inviting others into their home to demonstrate products.	•		Sales parties are seldom used for other than consumer products. Their major advantages are a good environment and subtle pressures from peers to buy.
5. Conventions	Technical and other societies have annual meetings at which relevant products can be displayed.	•		Trade association and technical society sometimes offer an excellent audience for presenting papers and talking to individual prospective customers. Advantages include selected audience, pleasant environment, interested audience. Selling must be low key - pretty much disguised as nonselling. These conventions are an excellent forum for NASA to educate industry concerning the shuttle service and its uses.
6. Meetings	Other types of groups sometimes invite displays at meetings.	•		Other meetings such as school and college groups, service clubs, etc., are similar to conventions but usually on a local scale. For special purposes, NASA should consider selected meetings to present the shuttle story.
7. Auction	Products are sold to highest bidder. Sometimes reserves are maintained.	•		Auctions offer an exciting, competitive, "do-it-now" atmosphere that can boost prices of products above normal levels. They are excellent marketing methods for some products where price is hard to determine - art works, used machinery, stocks. Supply and demand are the major factor in setting prices at auctions.
8. Schools and colleges	Presentations are made to groups at educational institutions.	•		Schools and colleges often have outside speakers on special subjects. Company speakers take advantage of these opportunities to put company and product messages across. It is a long-range activity - many years before it has any real effects on markets.
9. Schooling vans	Vans or trucks are equipped to teach groups to use, repair, etc., the products or services being sold.	•		Schooling vans are primarily to insure customer satisfaction with products by teaching how to use and maintain the products. They may also influence additional sales by exposing customers to new models and new uses of the products. They are often used with instruments, tools, or machinery that the customer uses in his production processes.

TABLE 10. METHODS FOR MARKETING PRODUCTS AND SERVICES (Continued)

Subject	Description	Applies to NASA	Does Not Apply to NASA	Comments
<b>E. Incentive</b>				
<b>1. Commissions</b>				
a. Bonuses	Additional compensation is granted if quotas are exceeded or company exceeds budgets.	•		Bonuses are given to motivate sales people or middlemen to intensify sales efforts for a product or service. Often bonuses are used to clear out old models or reduce inventories. Or sometimes to introduce a new model.
b. Commissions	Seller receives either a fixed fee or a percent of sale price.	•		Commissions are incentive payment methods for sales people and middlemen. By selling more they earn more. Such systems are widely used for all types of products and services. They may be fixed percent of sales, a sliding scale, or tied to other variables such as order sizes.
c. Interest in company	Seller receives a share of company for effort extended.		•	This method provides incentive for selling plus giving a continuing incentive by providing a share in ownership and thus the success of the company. It can give a salesman a more personal part in selling.
d. Profit sharing	Selling company profits are shared with salesmen on basis of contributions to success of sales.		•	This method is similar to interest in company but is really only on an annual basis. It can provide high incentive for one year, but provides no continuing ownership incentive. By having it every year such continuity can be provided. It has a negative aspect in that when profits are low or nonexistent, salesmen may get discouraged.
e. Over-quota rebates	Usually given to middlemen or retailers for exceeding quotas set by supplier. Sometimes applies to all units sold once quota is reached.		•	This method is commonly used to clear out old models at year end. It is a powerful incentive in some cases such as for auto dealers, since by selling maybe 100 extra autos in August, a dealer might get a \$100 rebate on 1,000 autos he sold during the year - a big chunk of money at one time.
f. Prizes	Prizes are given to best salesmen or those reaching a set goal.	•		Prizes provide incentive beyond their money's worth if well done because of the competitive aspect and excitement of a good contest. Also, the company can often get prizes at wholesale prices or less.
g. Advertising allowances	Usually given to middlemen or retailers by suppliers on basis of sizes of their annual purchases. Supposed to be used to advertise the products or services of the supplier.		•	Advertising allowances are often given to retailers as an incentive to handle or push a product line. The retailer is not always required to use the allowance for advertising but can consider it a discount - perhaps allowing him to cut prices.
h. Expense accounts	Salesmen are compensated for expenses incurred in selling.	•		Expense accounts are used to make sure the salesman can do his job properly. They allow him to entertain prospects, rent autos to get in more calls, etc. They are used by most companies.
<b>2. Gift</b>				
a. No obligation	Free weekends, sample, or other gifts are given in order to interest customer.		•	No-obligation gifts are used to attract prospects to a sales presentation. They vary from token gifts to some of substantial value. They appeal to the trait in people that likes to get something for nothing. When cleverly used they can be quite effective. But they can also be quite costly.
b. Conditional to sale	Trading stamps, premiums, etc., are given to customer in proportion to purchases.		•	Conditional-to-sale gifts are tied to sales; thus, unlike no-obligation gifts pay for themselves with each sale. They are a predictable sales expense. They appeal to the something for nothing instincts of people and can be quite effective if properly used.

TABLE 10. METHODS FOR MARKETING PRODUCTS AND SERVICES (Continued)

Subject	Description	Applies to NASA	Does Not Apply to NASA	Comments
3. Assistance				
a. Discounts	Financial discounts are given to quantity purchases or purchases by a given time. Cash deals sometimes allow discounts.	•		Discounts from regular prices are given to increase size of a sale, get customer to buy now, get customer to pay promptly, and other reasons. They are commonly used throughout industry for all types of products and in all parts of the distribution channels. They may be effective for NASA to get customers early to aid in scheduling of the shuttle service.
b. Credit	The seller either extends or arranges for credit.	•		Credit is provided to allow customers to afford purchases. Terms of credit can be a powerful tool in motivating customers to buy new, buy more, etc.
c. Time payments	Arrangements are made to pay over a long period of time either with interest and/or finance charges or without.	•		Time payment plans are a special type of credit that makes it easy for the customer to repay the credit by breaking the amount owed into small, regular segments.
d. Loss leader	A selected product is sold below cost to interest the potential purchaser in visiting store or in viewing other products.	•		Loss leaders are traffic builders. They attract customers because they are bargains. The seller depends on selling other, full margin items to the customers that are attracted by the loss leader. They are used mostly by retailers.
e. Land contract	Seller finances purchase at better terms than institutional financing will allow. Seller maintains ownership till buyer's equity reaches a predetermine level.	•		Land contracts are used to grant credit with better terms than for conventional mortgage or other credit methods. Usually the better terms involve a longer repayment period.
f. Free insurance	Insurance is provided on product or on purchaser by the seller.	•		Insurance is offered to buyers to provide warranty protection, credit repayment, protection, etc.
g. Guaranteed performance	Product is accepted back or replaced if it doesn't perform according to specifications.	•		Guaranteeing performance takes the risk away from the buyer. It adds credibility to the claims of the seller. It is most useful for industrial capital equipment such as machinery, computers, etc.
h. Product/service contracts	Service is provided at a fee.	•		Such contracts are a type of insurance that protects the buyer from major expenses because of an unforeseen failure of a product. It may include payment for losses other than the product itself such as spoilage of food in a home freezer.
i. Special training	Special training is given to salesmen, middlemen, or retailers to increase their effectiveness in selling the supplier's products or services.	•		This can be a highly effective way of building image and increasing sales. It can make the customer's job easier which is a strong incentive. It can also be a comfort to the customer because he knows he is doing things right. Sometimes it is essential if selling is to be at all effective - especially for complex products. This is true for NASA sales people.

TABLE 10. METHODS FOR MARKETING PRODUCTS AND SERVICES (Continued)

Subject	Description	Applies to NASA	Does Not Apply to NASA	Comments
4. Financial Arrangement				
a. Lease	Product is owned by seller or third party, but used on a fee basis for fixed periods.	•		Leasing eases the burdens of the customer. It can offer lower risk, lower monthly payment, accounting and tax advantages, etc. For the seller it can increase the market by making it easier for the customer to buy. It is used for consumer and nonconsumer items, but usually for relatively expensive items.
b. Franchise	Buyer is given an exclusive territory and marketing assistance in exchange for investing own money.		•	Franchising provides capital and manpower for the franchisor, and know-how and methods of operating for franchisees. It can also offer sources of equipment and supplies for the franchisee. It allows rapid expansion for a company.
c. Rent	User pays for use of product.	•		Renting is similar to leasing but usually with less restraints on the customer. He has more freedom to terminate the arrangement. However, it usually is more costly for the customer. For the seller, the risks are higher than leasing.
d. Consignment	Seller of goods delivers to a middleman, but keeps title. Transaction is not completed until middleman sells the goods.		•	Consignment is a method to get middlemen to stock more items than they want to. The seller must finance this inventory, thus it can be expensive. It is a method that is not generally liked by anybody. However, it can be effective in selling more products.
e. Lease with buy option	All or part of lease payment can be applied to purchase price within fixed time limits.	•		This is the same as leasing, but the customer can decide to buy what he has been leasing and get credit toward the purchase price. It may be full credit of payments he has made, or only a part. It encourages some customers to go ahead and lease since they can then decide later to buy if they wish and not take a serious loss.
f. Trade-ins	Allowances are given for trade-ins. Often of greater value than worth of the trade-in.		•	Trade-ins can be effective in making it possible for customers to buy since the trade-in allowance may cover the down payment. In some cases the seller can make additional profit on the trade-in. But often the reverse is true. To handle trade-in in a beneficial manner is a difficult task.
5. Gratuities				
a. Bribes	Compensation is given to person in decision-making position for preferred position.		•	Bribes are not mentioned as a marketing method. They are used, but are disguised. They can be effective, but are dangerous as a way of doing business.
b. Entertainment	Potential customer is entertained in a variety of ways from free shows to call girls.		•	Entertainment is a widely used marketing method. It is practiced in a wide range of ways - from a simple lunch to a lavish party. It can put the buyer in a receptive mood, give him a reason for buying, provide a good image for the seller. Extreme care is needed in how entertainment is used - it must be tailored to specific customers.

TABLE 10. METHODS FOR MARKETING PRODUCTS AND SERVICES (Continued)

Subject	Description	Applies to NASA	Does Not Apply to NASA	Comments
6. Other				
a. Free trial	Potential purchaser is allowed to use product for specified period of time free.	•		Free trial introduces a product to a buyer and gets him involved with it - even dependent on it. It can be costly if purchase rate is not high. It is used for a wide range of products.
b. Endorsements	Well-known or knowledgeable individuals attest to the quality or usefulness of the product.	•		Endorsements-- direct or inferred-- are used for consumer and nonconsumer products and services. The buyer can associate himself with the endorser or be comforted that so-and-so uses the product. Properly used, endorsements are quite effective.
c. Guarantees	The seller guarantees the product or service to be free from defects, as claimed, completely satisfying, etc., to the buyer; or money back, or free repair or replacement.	•		A guarantee protects the buyer from defective products. Terms are usually specified in writing, but there is often a tradition or common practice that reinforces such written guarantees. A buyer can be influenced to buy by a good guarantee since it insures the product is good when he buys it.
d. Return privileges	Seller allows buyer to return the product or service for refund of price if not satisfied.		•	Return privileges are generally used only if the product is good or if it is of very low value so not worth the effort to return. In addition, it is used by some retailers to build their images. It is especially effective in mail order selling or other cases where there is no chance for the buyer to examine the product before buying it.
<u>Miscellaneous</u>				
a. Identify and characterize market	Peculiarities of the market are defined and product possibilities identified which fit market characteristics.	•		This method is used prior to actual marketing to determine how to market. It also is used to guide product or service design, scale of production, and other nonmarketing activities. It must be done by NASA since the shuttle is not just a completely new service but a new capability for man.
b. Troubled customer	Potential customers are identified as those with problems which the product can solve.	•		This is a method for identifying better prospective customers. It is based on seeking customers with problems that the seller's product or service can ease.
c. Psychological research	Psychological characteristics of potential customers are identified and appealed to.		•	This method is used to identify psychological characteristics of prospective buyer in order to be able to design marketing programs to appeal to these characteristics. Such factors as status consciousness, sex drives, etc., are studied. It has been used primarily for consumer product marketing.

achieved. NASA will find it difficult to implement these methods, other than personal indirect, due to its general organizational lack of experience in industrial marketing. Most methods require specialized skills which are not readily apparent within NASA. It will also be difficult for NASA to orient its thinking to that of a seller, not a buyer, of services. To be successful any seller of services must be able to relate to its customers objectives instead of exclusively its own. This requires an attitudinal outlook and experience not evident within NASA as an organization. (That is not to say selected individuals within NASA do not possess such skill, understanding, and experience.)

Since the selection of any method depends to a great extent on the overall strategies used, it is appropriate to briefly discuss certain factors relating to marketing activities in industry. Industry is not homogenous. It consists of organizations of many sizes, interest, objectives, and philosophies. A marketing approach that may work for one organization may be totally unsuitable for another. Market segmentation is generally used to try to group potential markets. Four basic methods of segmentation are recognized: (1) producer segments where the market is divided by product types, ingredients, or production techniques, (2) demographic segments where the market is divided by age, sex, region, etc., (3) special interest segments where the market is divided into special interests such as sport cars, fishing, etc., and (4) psychological and sociological need segments where the market is divided by focusing on needs and desires with particular emphasis on the nonphysical elements in product satisfaction.

Unfortunately, this still leaves a very complicated and difficult task of relating market segments to specific product line(s) and product development. For STS there is no clear-cut answer to this dilemma because of the wide variety of potential applications. For example, if one thinks of the possible ways to categorize the STS markets it can be done in at least four different ways as shown in Table 11. Each of the subcategories could be segmented to almost an infinite number of market opportunities. Even if you pick out just domestic industry there are numerous ways to segment it as demonstrated by the variety of methods used in econometric

TABLE 11. POSSIBLE CATEGORIES OF THE MARKET FOR STS

- 
- BY USE
    - Research and Development Data
    - Research and Development Services
    - Research and Development Facilities
    - Transportation Service for Observations
    - Transportation Service for Manufacturing
    - Transportation Service for Facilities
  - BY MOTIVATION
    - Scientific Advancement
    - Economic Gain
    - Social Gain
  - BY CLASS OF CUSTOMER
 

○ Domestic Industry	○ U. S. Government
○ Foreign Industry	○ State and Local Government
○ Foundations	○ Foreign Government
○ Universities	○ International Agencies
○ Research Institute	○ Groups of Agencies
○ Groups	
  - BY TECHNICAL DISCIPLINE
 

○ Astronomy	○ Communications and Navigation
○ Solar Physics	○ Earth and Ocean Physics
○ High Energy Astrophysics	○ Materials Science and Space Processing
○ Life Sciences	○ Space Technology
○ Atmospheric and Space Physics	
-

models, business magazines, and government business statistics. Obviously, no one way is correct and it is the difficult job of the marketing operation to define the best combination of ways for its own specific needs. A great deal of time, effort, specialized manpower, and dollars will be required to determine the proper approaches to market segmentation for STS.

TASK IV - ANALYSIS OF BARRIERS TO POTENTIAL  
NASA-USER INTERACTIONS

Objective

The objective of Task IV was to identify potential market-related barriers which might impede or limit new users from using STS services.

Procedure

Again it can be pointed out that obtaining new users for STS parallels exactly the marketing function in industrial organizations. It therefore is reasonable that those situations, actions, or institutions that cause problems or become barriers to successful marketing in industry would also be applicable to NASA and STS. Specialists in the field of industrial marketing prepared a detailed listing and a brief description of barriers which reduce the effectiveness of marketing operations in industry. The listing was intended to serve as a primer for use in structuring organizational approaches to new user development. Comments were prepared regarding the relationship of each barrier situation to NASA and STS. The judgements were of necessity subjective and represented the conclusions of a committee of three specialists. Table 12 presents the input-output relationship in Task IV.

Discussion of Results

The results of the identification and analysis of potential barriers in marketing interactions are presented in Table 13. Six major classes of barriers to marketing interaction were identified. These include: (1) people barriers, (2) product or service barriers, (3) financial barriers, (4) organizational barriers, (5) information barriers, and (6) situation barriers. At least 45 of the 106 marketing barriers

TABLE 12. INPUT-OUTPUT DATA RELATIONSHIPS FOR TASK IV



<u>INPUT</u>		<u>ACTIVITY</u>		<u>OUTPUT</u>
RELATED EXPERIENCE OF INDUSTRIAL AND CONTRACT RESEARCH ORGANIZATIONS IN MARKETING INTER-ACTIONS		DEVELOP A LISTING AND DESCRIPTION OF ALL ACTIVE MARKETING BARRIERS ENCOUNTERED IN INDUSTRIAL SALES. APPLY EXPERIENCE OF SPECIALISTS TO ESTABLISH THE VALUE OF THESE METHODS FOR NASA AND STS		<ul style="list-style-type: none"> <li>• A PRIMER OF MARKETING BARRIERS FOR USE BY NON-SPECIALISTS</li> <li>• AN ANALYSIS OF THE RELATIVE STRENGTH OF THESE BARRIERS AS RELATED TO STS</li> <li>• THE RESULTANT DATA TO BE USED IN TASK VI – DEVELOPMENT OF RECOMMENDED STRATEGIES</li> </ul>

TABLE 13. BARRIERS TO INTERACTION IN MARKETING SITUATIONS

Subject	Description			Application to NASA
		Yes	No	How It Applies
<b>A. People Barriers</b>				
1. Credibility	The buyer or seller knows or believes that the other party is not credible.	•		NASA is not credible because it appears to have based shuttle program on own goals and technology rather than on a market need.
2. Ignorance	The buyer or seller is ignorant of necessary elements of the situation.	•		Considerable ignorance by NASA of potential customers. Also, potential customers and general public ignorant of NASA shuttle program.
3. Hostility	The buyer or seller feels hostility toward the other party.	•		Large numbers of the general public are hostile toward NASA because they want NASA funds used for more immediate problems.
4. Prejudice	The buyer or seller has a prejudice concerning the other party.	•		NASA is prejudiced toward own viewpoint and potential customers towards their own.
5. Misunderstanding	There is lack of understanding between buyer and seller concerning the situation.	•		Neither potential customers nor general public understands what the space shuttle service might do for them.
6. Not properly prepared	The buyer or seller is not properly prepared to progress with or complete the sale.	•		NASA is not prepared to market the space shuttle in terms potential customers would understand. Potential customers not prepared to use shuttle because NASA has not prepared them.
7. Cultural differences	The different cultural backgrounds of buyer and seller interfere with the situation.	•		The cultural backgrounds of most NASA people and most customer people are similar, so this does not provide a barrier. Will be a factor in foreign markets.
8. Language differences	The buyer and seller interpret differently the meanings of what is said, or actually speak different languages.	•		English is base language of NASA and primary customers. Slight differences in usage and idioms between government and industry should not be a significant barrier.
9. Misinterpretations	The buyer or seller misinterprets the situation.	•		Many potential customers believe that NASA shuttle program is only a means to perpetuate NASA, not to serve customers.
10. Incompatibility	The buyer and seller are not compatible.	•		NASA is technology and politics oriented, and potential customers are business oriented.
11. Wrong people	The buyer or seller is the wrong person to be a party to the situation.	•		If there is a basis for a sales situation, both NASA and the buyer should be able to put the right people together.
12. Grudges	The buyer or seller has a grudge against the other.	•		At the level of personnel that will have to be involved, it is not likely that NASA or the buyer will put grudge-bearing people into the sales situation.
13. Miscalculations	The buyer or seller miscalculates some elements of the situation.	•		It is likely that the NASA and buyer people will be wise enough not to miscalculate.

TABLE 13. BARRIERS TO INTERACTION IN MARKETING SITUATIONS  
(Continued)

Subject	Description			Application to NASA
		Yes	No	How It Applies
<u>People Barriers</u> (Continued)				
14. Lack of motivation	The buyer or seller is not properly motivated to progress with the transaction.	•		Potential customers are not conditioned to think of NASA as a supplier, so are not motivated to consider the shuttle service.
15. Different objectives	The buyer and seller have different objectives that interfere with the progress of the transaction.	•		Objectives of NASA are to serve the public and to advance science. Objectives of potential customers are to make a profit and to grow.
16. Distinterest	The buyer or seller has little or no interest in the transaction.	•		Potential customers have more important problems now than the shuttle--such as pollution control regulations, difficulty of getting fuels and energy, etc. Therefore, not much interested in shuttle.
17. Inertia	The buyer or seller put off getting down to business.	•		NASA and potential customers have been on separate courses, so inertia tends to keep them apart.
18. Poor appearance	The appearance of the buyer or seller is not pleasing to the other party.	•		This is unlikely concerning the NASA sales situation
19. Poor habits	The buyer or seller has habits that are displeasing to the other.	•		It is not likely that parties to the NASA sales situation will have unpleasing habits that interfere with the sales.
20. Wrong social position	The buyer or seller has a social position not suited to the marketing situation.	•		In the NASA-customer situation, unsuitable social position of any parties is not likely.
<u>B. Product or Service Barriers</u>				
1. Poor (or wrong) design	The product (or service) is poorly or wrongly designed for the market for which it is intended.	•		The lead time is sufficient for NASA to make sure the shuttle service is properly designed for its markets.
2. Poor quality	The quality of the product is too low for its market.	•		It is inconceivable that the NASA shuttle will be of poor quality.
3. Overdesign	The product is overdesigned for its intended market.	•		NASA missions require overdesign and resultant high costs. Potential customers not generally amenable to the high costs of overdesign.
4. Wrong product (or service)	The product is not the right one for its market.	•		Lead time is sufficient to insure the NASA service is the right service.
5. Incomplete line	The product does not have companion products needed to develop a market.	•		Companion services, if needed, can be designed and offered by NASA.
6. Too big	The product is too large for its market.	•		This does not apply to the NASA shuttle service.
7. Not needed	The product is one for which there is no need.	•		Potential customers have no need for the shuttle since it has not been available. NASA has not yet shown them a need.

TABLE 13. BARRIERS TO INTERACTION IN MARKETING SITUATIONS  
(Continued)

Subject	Description	Application to NASA	
		Yes	No
<u>Product or Service Barriers</u> (Continued)			
8. Unsafe	The product is not safe to use.		• Safety is a byword of NASA.
9. Pollutes	The product causes pollution.	•	Space debris may be a serious consideration.
10. Difficult to use	The product is too hard to use.	•	There will be many manual problems in using the shuttle--scheduling, unusual environment, necessity of minimizing size and weight, etc.
11. Repair and maintenance problems	The product requires excessive servicing.	•	Because of remote and not readily accessible location and status of shuttle, it will be difficult to get spare parts and do repairs.
12. Too complicated	The product is too complex for its market.	•	The complexity of the shuttle service will make it hard for customers to interface with the requirements of the service.
13. Poor styling	The styling of the product is not good.	•	Styling is of no importance to the shuttle.
14. Not compatible	The product is not compatible with other products with which it is used.	•	Things that are now done on earth must be done elsewhere with the shuttle. The two environments and their requirements are not compatible.
15. Too small	The product is not large enough for its market.	•	This does not apply to the NASA service.
16. Too light	The product does not weigh enough for its market.	•	This does not apply to the NASA service.
17. Too heavy	The product weighs too much for its market.	•	This does not apply to the NASA service.
18. Hard to assemble	The product is difficult to put together.	•	May be difficult to have specially trained people in space to do each job. Also, lack of gravity and other differences may make assembly of things difficult.
19. Rapid depreciation	The product loses value quickly after purchase.	•	Because there may be substantial risk of failures of the service, rapid depreciation rates of customer equipment will be necessary.
<u>C. Financial Barriers</u>			
1. Over priced	The price of the product (or service) is too high.	•	Potential customers will view service as an unusual, unknown, previously unnecessary cost item.
2. Lack of credit	Sufficient credit is not available for purchasing the product.	•	Availability of credit is not likely to influence demand for the shuttle one way or the other.
3. Can't afford to buy	Potential customers cannot afford to buy the product.	•	There can be many reasons that potential customers can't afford to buy the shuttle service--too high minimum price, high costs of adapting to the shuttle, etc.

TABLE 13. BARRIERS TO INTERACTION IN MARKETING SITUATIONS  
(Continued)

		Application to NASA	
Subject	Description	Yes	No
		How It Applies	
<u>Financial Barriers</u> (Continued)			
4. Expensive to install	The product is too expensive to install.	•	Configuration and size of shuttle will be such as to make it expensive to install equipment and materials in it.
5. Expensive to service or maintain	The cost of servicing the product in use is too high.	•	Equipment will be expensive to service, rejects will be expensive to recycle or repair, etc.
6. High interest costs	Interest costs for the purchase are excessive.	•	This is not likely to be a deterrent to use of the NASA service.
7. High taxes	Taxes on the product are excessive.	•	No taxes are likely.
8. Unfavorable foreign exchange rate	Exchange rates between buyer in one nation and seller in another are unfavorable to one of the parties.	•	Not likely to be a dominate factor.
9. Balance of payments	Balance of payments between buyer and seller nations discourage purchase.	•	Not likely to be a dominate factor.
10. No lease or rent option	Lease or rent plans not available to buyer.	•	Lease or rent options are likely to be made available as needed.
11. Unsatisfactory terms of sale	The terms of sale offered or demanded are not satisfactory to the other party.	•	Satisfactory terms are likely to be offered.
12. High operating cost	The product costs too much to run.	•	The potential customers will have high costs associated with using the shuttle service--process redesign, packing, transportation, etc.
13. Tight money	There is a shortage of money available to the buyer.	•	If the shuttle service is needed by customer, tight money will not be a significant barrier.
14. Exchange rate uncertainty	The relative values of currencies of buying and selling countries are expected to change.	•	Domestic markets are expected to be initial markets for the service, thus does not apply.
<u>D. Organizational Barriers</u>			
1. No alternate sources	Buyer must depend on only one supplier because there are no competitors.	•	There are no present or foreseeable future, alternate sources for the NASA shuttle service. Potential customers will resist putting themselves at the mercy of a single source, especially a government agency.
2. Poor credibility	One of the companies or organizations involved is not credible.	•	NASA is not fully credible to customers as a seller of services because they have been primarily a buyer.
3. Poor product	The product (or service) is not always available when wanted, or lead times for ordering are excessive.	•	Long lead times, necessity for precise scheduling, etc., will make for poor availability of the shuttle service for many potential customers.

TABLE 13. BARRIERS TO INTERACTION IN MARKETING SITUATIONS  
(Continued)

Subject	Description	Application to NASA		How It Applies
		Yes	No	
<u>Organizational Barriers</u> (Continued)				
4. Poor delivery	Delivery of the product is not dependable			• With the lead time available for getting ready, delivery should be on schedule.
5. Poor technical service	Technical service is not available in the form or to the extent wanted by the buyer.			• NASA should be able to determine what technical service is needed and then make it available.
6. Poor guarantee	The product guarantee is not satisfactory to the buyer.			• NASA should be able to determine what guarantee is necessary and then offer it.
7. Poor return or exchange policy	Return or exchange options are not satisfactory.			• Lead time is sufficient to determine what policy is required and then implement it.
8. Not trustworthy	One of the parties does not trust the other.	•		In a marketing situation, mutual trust between NASA and the customer may be difficult to achieve.
9. Poor reputation	One of the parties has a poor reputation with the other.		•	It is not likely that the reputation of NASA or the customer will be a barrier by the time a sales situation is established.
10. Poor market	The seller has insufficient information concerning its market.	•		NASA has little or no experience as a supplier. As a result, it must build its market information capabilities from about zero.
11. Inflexibility	One of the parties maintains too rigid a position concerning the transaction.	•		NASA position must be based on government rules, and potential customers have own methods that differ from these. Thus, two noncompatible rigid positions
12. Poor marketing	The seller's marketing program is not satisfactory.	•		Having done little or no marketing, NASA has poor marketing capability.
13. Wrong prospective customers	The seller tries to market to the wrong prospects.		•	The lead time is sufficient for NASA to do the market research necessary to determine who the best customers are likely to be.
14. Wrong suppliers	The buyer tries to buy from the wrong suppliers.		•	This does not apply since NASA is only supplier.
15. Poor incentive for salesmen	The seller does not motivate its salesmen properly.		•	NASA has sufficient time to investigate and establish proper sales incentives.
16. Overselling	The seller oversells its product.		•	It is unlikely that NASA will oversell.
17. Misconceptions	One organization has wrong impressions of the other.	•		Potential customers often think of NASA as an inflexible, red-tape-ridden bureaucracy.
18. Poor management	The management of buyer or seller is poor, or considered poor.		•	Good reputations for managements of NASA and buyers should have been established by the time the marketing situation has arrived.
19. Lack of service	The buyer or seller does not have service facilities adequate to maintain the product.		•	This does not apply, since NASA will have adequate facilities.
20. Complex communications channels	The channels of communication within the buyer or seller organizations, or between the two are so complex as to interfere with the sale.		•	Although this could normally be a problem within government agencies, the lead time is long enough for NASA to streamline the channels.

TABLE 13. BARRIERS TO INTERACTION IN MARKETING SITUATIONS  
(Continued)

Subject	Description	Application to NASA	
		Yes	No
<u>Organizational Barriers</u> (Continued)			
21. Limited line of middlemen	Middlemen have too limited lines to adequately serve customers.		• The shuttle service is all that is needed, so limited line does not apply.
22. Long waiting time	The buyer must wait an excessive period of time for delivery of the product or service.		• Lead time is sufficient for NASA to adjust introduction of the service to a time short enough so as not to be a barrier.
23. Limited floor space	The buyer or seller has too little floor area to use, display, or otherwise handle the product.		• Does not apply to NASA with its many square miles of land.
<u>E. Information Barriers</u>			
1. Inadequate description	The product (or service) is not described completely enough.		• There is plenty of lead time for NASA to determine description requirements and design them.
2. Inadequate instructions	The instructions for use of the product are not complete enough.		• NASA has sufficient time to determine needs for instructions and design them.
3. Unbelievable claims	Claims made for the product are not believable.		• It is expected that NASA will be careful of the claims it makes for the service.
4. Poor sales appeals	The wrong sales appeals are used to market the product.	•	NASA has no sales appeals for the shuttle service. To create a demand, must have sound ones.
5. Inadequate demonstration	The product is not demonstrated properly to prove utility to the buyer.	•	Shuttle service has not been demonstrated. Thus, completely inadequate demonstration.
6. No chance to examine product (or service)	The buyer is not provided with an opportunity to adequately examine the product.	•	It is expected that NASA will allow plenty of time for examination of the service.
7. Insufficient knowledge of customers	The seller does not understand the prospective buyer well enough.	•	NASA has dealt with industry as a supplier of products and services, not as potential buyers of NASA services. Thus, NASA has little or no knowledge of potential customers.
8. Insufficient knowledge of uses	The seller or buyer does not understand the uses of the product well enough.	•	Neither NASA nor potential customers know fully about uses for the shuttle service.
9. Poor packaging	The product is not packaged properly.	•	Packaging does not apply to shuttle service.
10. Inadequate internal information	The buyer or seller is not familiar enough with own needs and activities.	•	It is expected that the lead time is sufficient for NASA to determine buyer needs, interface the service with these needs, and inform buyers concerning what they need to know.
11. Inadequate educational program	The seller does not have an educational program adequate to help market the product.	•	NASA has not properly educated potential customers or the general public concerning the shuttle service, or about any other services it may sell.

TABLE 13. BARRIERS TO INTERACTION IN MARKETING SITUATIONS  
(Continued)

Subject	Description	Application to NASA	
		Yes	No
Information Barriers (Continued)		Hot It Applies	
12. Wrong location	The location of the buyer or seller interferes with the sale.		<ul style="list-style-type: none"><li>• This does not apply to such a major and costly service as the shuttle.</li></ul>
13. Competitive information	Information provided to buyer or seller by competitors interferes with the sale.		<ul style="list-style-type: none"><li>• No competitors, so does not apply.</li></ul>
F. Situation Barriers			
1. Poor timing	The product (or service) is introduced at an inappropriate time.		<ul style="list-style-type: none"><li>• NASA has adequate of lead time to determine proper timing.</li></ul>
2. Inadequate transportation	Transportation facilities are such as to interfere with proper delivery of the product.		<ul style="list-style-type: none"><li>• Does not apply.</li></ul>
3. Poor general economic relations	General economic conditions are such as to interfere with the transaction.		<ul style="list-style-type: none"><li>• If the buyer has real need of the service, economic conditions are not likely to be a barrier.</li></ul>
4. Foreign trade quotas	Import or export quotas interfere with sales between countries.		<ul style="list-style-type: none"><li>• Not expected to be significant in STS use.</li></ul>
5. No place to get together	Buyer and seller have no place to negotiate the sale.		<ul style="list-style-type: none"><li>• Lead time is long enough to arrange meeting places to market the service.</li></ul>
6. Scattered markets	Markets are in scattered locations that interfere with marketing.	<ul style="list-style-type: none"><li>•</li></ul>	<ul style="list-style-type: none"><li>• Wide distribution of potential markets will require very large effort to obtain coverage.</li></ul>
7. Legal restrictions (safety, pollution, building codes, antitrust, etc.)	There are laws and regulations that hamper marketing.	<ul style="list-style-type: none"><li>•</li></ul>	<ul style="list-style-type: none"><li>• Lead time is sufficient for NASA to analyze legal problems and arrange to change or by-pass them. However, all industry desires are not likely to be achievable.</li></ul>
8. Changes in social factors	Changing social factors interfere with supply or demand for the product.	<ul style="list-style-type: none"><li>•</li></ul>	<ul style="list-style-type: none"><li>• It is likely that social factors will have a significant effect on the sales situation for the shuttle.</li></ul>
9. Political barriers	Political considerations interfere with marketing.		<ul style="list-style-type: none"><li>• Political factors probably are now important but lead time is adequate to remedy this situation.</li></ul>
10. Acts of God	Storms, floods, or other acts of God interfere with marketing.		<ul style="list-style-type: none"><li>• Nothing can be done about Acts of God.</li></ul>
11. Strikes	A strike at buyer or seller provides a barrier to a sale.		<ul style="list-style-type: none"><li>• The chances of this happening are low enough that probably not important to selling NASA service.</li></ul>
12. Demonstrations by activists	Picketing or other public demonstrations by groups of concerned people interferes with the transaction.		<ul style="list-style-type: none"><li>• This is possibility now. But lead time is enough for NASA to plan and implement a public relations program to minimize the effects.</li></ul>
13. Mood of the people	The mood of the general public is such as to interfere with a sale.		<ul style="list-style-type: none"><li>• This may be true now. But a public relations program can be designed to overcome this barrier.</li></ul>

TABLE 13. BARRIERS TO INTERACTION IN MARKETING SITUATIONS  
(Continued)

Subject	Description	Application to NASA		
		Yes	No	How It Applies
<u>Situation Barriers</u> (Continued)				
14. Distant market	The market is so far from the seller as to interfere with the sale.			• Does not apply to such a major and costly service.
15. Too much at one time	The product or service must be sold or purchased in such large quantities as to interfere with selling.			• Lead time is sufficient for NASA to design service in small enough purchase increments to minimize such a barrier.
16. Too little at one time	The product or service is sold or bought in such small quantities that it interferes with selling.			• This is not likely to apply to shuttle.
17. Lack of distribution channels	Adequate distribution channels are not available.	•		Since NASA will be offering a new and unique service, there are no established distribution channels. They must be created.

may be significant in obtaining new users for STS. It should be pointed out that barriers can only be minimized; as long as people are involved it will be impossible to completely eliminate all barriers.

In examining the barriers presented in Table 13 the areas of trust and confidence contribute heavily to many of the barriers. This is most significant for interactions between any government agency, such as NASA, and industry. Over the years, industry has developed an inherent mistrust of involvement with the U. S. Government. Primarily this mistrust has grown out of fear of increasing governmental control of private industry. This control takes such forms as antitrust actions, price controls, punitive taxes, accounting and business practices. While these actions generally have been within the established laws of the land, they nevertheless have caused problems in the conduct of business and have contributed to this overall mistrust which has caused some companies to avoid doing direct business with the government. Obviously if an organization has misgivings about involvement with the government it is reasonable to assume it will be even more reluctant to directly invest its resources in a government-operated activity.

Basically the government and industry have different objectives; this further contributes to interaction problems. The various government agencies are set up to serve the best interests of the general public. Industrial organizations are established primarily to provide maximum return on the stockholders investments. In many instances, these objectives can be in opposition. One specific example related to STS is ownership of data or proprietary rights. If industry invests its own money, it generally wants exclusive use of any data/product that might result. However, in some instances this may be in conflict with established policies of the government. Unless suitable guidelines can be established at a very early time, industry is likely to avoid any investment of its money.

One additional comment should be made relative to the barriers listed in Table 13. Many of the barriers are quite time dependent. Assumptions were made during the analysis of the barriers that proper use would be made of the lead time between now and the operation of STS

to overcome some present limitations. A specific example is the providing of potential users with adequate information to permit them to evaluate the opportunity by their usual business analysis techniques. Numerous other examples can be seen in Table 13. If proper use is not made of that lead time, these barriers will become relevant and the in-depth involvement by industry will be pushed further into the future.

TASK VI - PREPARATION OF AN STS USER DEVELOPMENT  
STRATEGY FOR INDUSTRY

Objective

The objective of Task VI was to prepare a recommended approach for developing new user/uses for STS in industry.

Procedure

In Tasks II and III methods used by industry for identifying new uses/products and new users were established and analyzed for application to STS. In Task IV, potential barriers for interaction between NASA and industry were evaluated. The outputs from these Tasks were integrated during Task VI. In addition, information regarding organizational structures of marketing operations in industry was used to prepare a functional description for the strategy chosen. A description of the activities accomplished by each function was prepared. Finally, a discussion of the considerations involved in implementation of the selected strategy was prepared. Table 14 presents the input-output relationship in Task VI.



Discussion of Results

The Strategy

As mentioned earlier in this report the problem of obtaining new uses and users for STS is exactly the same problem industry has in marketing its products. Analysis of this specific problem has only reinforced the idea that industrial marketing approaches should be employed. However, several key items have been enumerated in Tasks II, III, and IV which suggest that NASA probably cannot accomplish this undertaking by itself. These items are:

1. Lack of NASA experience in industrial marketing techniques - This can be overcome only by extensive build-up of specialized staff from industry.

TABLE 14. INPUT-OUTPUT DATA RELATIONSHIPS FOR TASK VI

<u>INPUT</u>		<u>ACTIVITY</u>		<u>OUTPUT</u>
DATA AND RESULTS FROM TASKS I THROUGH V PLUS RELATED EXPERIENCE IN INDUSTRIAL MARKETING STRATEGIES AND STRUCTURES		ANALYZE THE INPUT DATA WITH SPECIAL ATTENTION TO THE UNIQUE CONDITIONS WHICH ARE PERTINENT TO STS USER DEVELOPMENT. SELECT THE BEST PROBABLE APPROACH AND DEFINE AN ORGANIZATION AND IMPLEMENTATION PROCEDURE		<ul style="list-style-type: none"> <li>• A RECOMMENDED STRATEGY TO DEVELOP THE INDUSTRIAL USER COMMUNITY</li> <li>• A FUNCTIONAL ORGANIZATION TO ACCOMPLISH THE DEVELOPMENT OF THE INDUSTRIAL USER COMMUNITY</li> <li>• A DESCRIPTION OF THE ACTIVITIES OF EACH FUNCTIONAL UNIT</li> <li>• A DEFINITION OF THE ORGANIZATIONAL RESPONSIBILITY FOR EACH ACTIVITY</li> <li>• A DISCUSSION OF IMPLEMENTATION CONSIDERATIONS</li> </ul>

These types of people are extremely difficult to obtain and are very well paid. While it would be possible to build such a staff, it is doubtful if it is the most cost effective way to do the job.

2. Basic conflict of the objectives between NASA and industry - NASA may find it difficult to adjust to thinking in terms of industries' needs and objectives. The emphasis on economic as opposed to technical considerations is most important in all industry decisions.
3. Mistrust of Government involvement by industry - while not NASA's fault, it still falls under the umbrella of industry mistrust of government involvement. This will cause increased complications in doing business with industry. Coupled with Items 1 and 2 above, this casts serious doubts on how effective NASA can be in a direct industrial user development mode.
4. Protection of proprietary rights - industry will expect to have any developments on which they spend their own money, to belong exclusively to them. This may not be possible for NASA to do. Likewise, there is a credibility gap regarding the ability of government personnel to honor secrecy agreements and to protect proprietary information. This may be overcome in time but it will present serious problems initially.
5. NASA image problem - there will be questions regarding NASA objectivity and propriety in directly supporting profit-making organizations. Separation of NASA's right and proper role of advancement of the practical peaceful use of space from that of unduely benefiting specific organizations or industries will be difficult at best. Reprecussions could be felt in public opinion and in budgets provided by Congress.

The impact of these five items suggests that it would be most practical for NASA to utilize a Middleman approach to the development of the industrial user community. This approach is commonly used by industry to overcome similar problems in their marketing programs. The Middleman minimizes or eliminates the problems encountered in direct involvement by NASA.

The basic theme of this approach can be stated as "Let NASA do those things NASA does best, while another organization(s) undertakes the activities for which NASA is not equipped". Specifically, NASA is outstanding in program management, basic research, systems development, and systems operations. It should continue to concentrate in those areas and not dilute its management talent and resources by structuring to fully handle new user development.

The Middleman organization(s) should have certain characteristics if it is to be of maximum effectiveness for new user development. These characteristics include:

1. Broad industry contacts at management levels - broad contacts are required because of the wide variety of potential applications. Management level is the appropriate entry level for an undertaking of this type. Technical staff only recommend in most organizations and if financial commitments are to be obtained, management must be involved.
2. Neutral position, i.e., noncompetitive in industry - this is especially important if full and open communication is to be possible. Industrial organizations will be very reluctant to expose their ideas and business plans to potential competitors.
3. Objectivity - this is related to the neutral position but also includes the ability to fully appreciate the industrial organization's problem and not to be unduly tied to the NASA viewpoint or their own vested interests.
4. Technical breadth - since nearly all potential uses are technical, it is very important that the Middleman organization have adequate technical breadth, including an in-depth knowledge of space activities, to insure proper understanding of the problem and its solutions. This very nearly approximates the technical manufacture's representative in industry; if he does not have good technical knowledge of the product, he will not be successful in market development and/or sales.
5. Experience in technical market development - without this characteristic, NASA would be paying for training of another organization's staff - this makes no sense.

6. Applications oriented - NASA will continue to carry out the basic research related to its basic missions in space. The Middleman organization must be able to translate that basic information into meaningful applications for industry. This infers an excellent business understanding as well as technical skills.
7. Ability to protect proprietary interest - to achieve maximum industrial support, the Middleman organization must be able to demonstrate that the users ideas and information will be released to no other organization, including NASA.

Examination of these characteristics suggests that a quasi-public organization or a nonprofit organization should be considered. Profit oriented organizations are unlikely to be able to satisfy Characteristics 2, 3, and 7 to the satisfaction of other industrial users.

It is envisioned that the Middleman organization would operate under contract to NASA through the early user development period. As the user development increased, NASA contract support to the Middleman organization would reduce and the cost would be borne by the user community. In this way, NASA would free-up its resources for its own operational needs. The importance of this cannot be over emphasized if NASA indeed does receive a level budget allocation in the years to come as is presently planned. This is a key factor in the recommendation of a strategy in which NASA does not tie up its resources by building a large internal staff, the cost of which it cannot abandon in the future.

### The Functions

Having defined a general strategy, it now remains to enumerate the specific functions which must be accomplished. Also, an organizational approach to conducting those functions is needed. Outlined below is a discussion of both functions and possible organization.

A listing of the required functions for a new user/use development activity is provided in Table 15. The interrelationships among the functions is given in Figure 3. Note that interactions are limited in

**TABLE 15. FUNCTIONS REQUIRED IN A NEW USER/USE DEVELOPMENT ACTIVITY**

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PROGRAM ADMINISTRATION
STRATEGIC PLANNING
MARKET ANALYSIS
TECHNICAL DEVELOPMENT
MARKET DEVELOPMENT
SALES
OPERATIONS
CUSTOMER RELATIONS
PUBLIC RELATIONS

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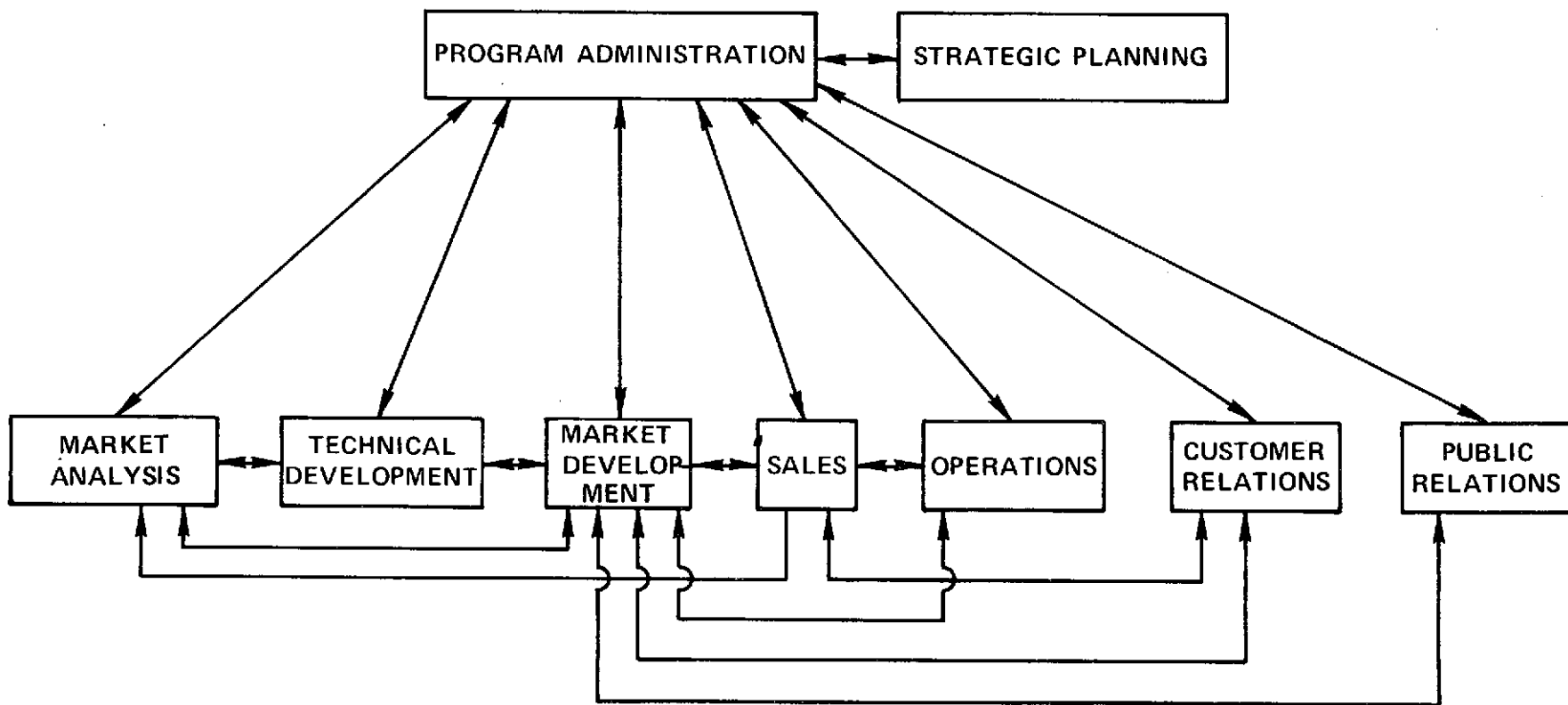


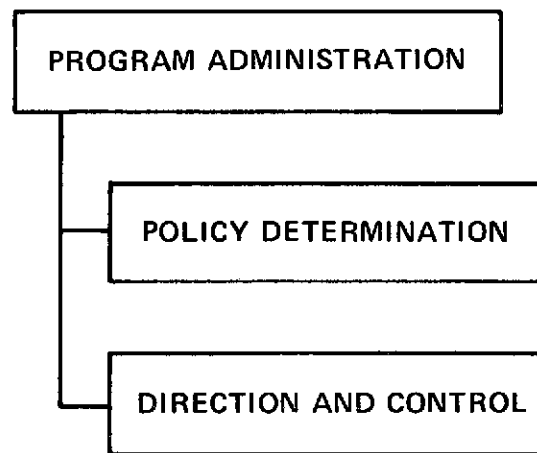
FIGURE 3. INTERRELATIONSHIPS AMONG FUNCTIONS REQUIRED IN NEW USER/USE DEVELOPMENT ACTIVITY

some instances. This is done to insure market needs and not personal interests are best served. For example, feedback from the sales operation is provided directly to only the market analysis and market development groups. This information is filtered in those operations before going into the technical development group. If this is not done, the sales staff would have the technical staff starting "pet projects" which may be of benefit to a single user but which might be counterproductive to the total marketing effort. Limits on interactions exist between other units for similar reasons.

It can be seen that the market development group really is the hub of the total operation. Without exception, they have direct input and feedback with each other function. As is discussed later, this is the integrating function which puts the pieces together and defines specific strategies. As such, it needs all of the information available. If a marketing information system were deemed necessary, it would be located in the market development operation.

Each of the functional operations have scopes of activities which must be accomplished. These activities are further discussed below. They define "what" must be done; the "how" will be accomplished by methods defined in Task II and III for market analysis and market development. The "how" for the other functions was beyond the scope of this effort. It must be pointed out, however, that selection of a specific method ("how") cannot and should not be done until a specific operational objective has been defined. As pointed out earlier, what works in one case will not necessarily work in another. It is for this reason that skilled, experienced staff is required in each functional operation. A simple cookbook approach will not be effective.

Program Administration. Figure 4 shows the activities to be accomplished by the program administration function. It should be quite evident that these activities are clearly the province of NASA. Only NASA can ultimately determine what policies will be implemented in such areas as user fees, safety requirements, indemnities. Also, since NASA has ultimate responsibility for the total STS program, it clearly has a direction and control duty regarding any operation affecting the successful implementation of STS.



**FIGURE 4. ACTIVITIES IN THE PROGRAM ADMINISTRATION FUNCTION**

Strategic Planning. The activities to be accomplished by the strategic planning function are given in Figure 5. This function provides the long-range continuity to the total new user/use activity.

Organization Structure. Here the details of structuring the operation are accomplished. Both NASA and the Middleman organization contribute. NASA is responsible for the overall general structure as well as its own specific internal structures. The Middleman organization is responsible for that structuring external to NASA.

Technical Marketing Planning. Here long-rang forecasting is accomplished regarding where technologies are going and how STS might impact them. This is the Middleman organization's responsibility. Staffing requires skills in technology forecasting and futures analysis. Also, this group should make extensive use of outside consultants to avoid the not-invented-here syndrome from developing. Activities should be structured according to whatever market segments are eventually selected.

Facility Requirement Identification. This activity uses the marketing and forecasting information to identify facility requirements for new users/uses of STS. This is the Middleman organization's responsibility. This activity does not design and build facilities. Its purpose is to identify classes, parametric capabilities, and numbers of facilities which will be required. It also should be a screen to separate those facilities which should be NASA developed and those which should be contractor developed.

Facility Requirement Implementation. This group defines the necessary strategies and actions required to obtain the facilities identified as required for future users/uses. This is primarily a NASA responsibility. It is not intended that this group actually design or build facilities. Their mission is (1) to justify the facilities within NASA and (2) to interface with other operating NASA units to insure the facilities are available when required.

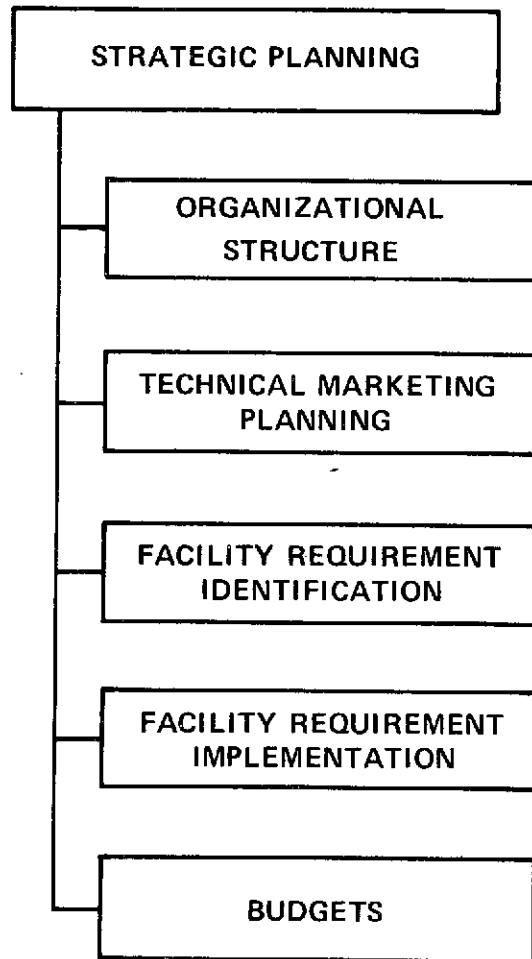


FIGURE 5. ACTIVITIES IN THE STRATEGIC PLANNING FUNCTION

Budgets. This is a required administrative activity and is a shared responsibility of NASA and the Middleman organization.

Market Analysis. Figure 6 shows the activities to be accomplished by the market analysis function. This function provides the idea identification, analysis, and basic marketing data required for the total new user/use activity.

Definition of Existing Ideas. The activity will compile all existing ideas for the use of STS. Major responsibility for this activity should rest with NASA since most existing ideas have been generated within NASA or under contract to NASA. The Middleman organization will have a minor responsibility also, primarily for the open literature review and for establishing a format for data presentation which will be useful in subsequent analysis.

Refinement of Existing Ideas Into Market Data. This activity reduces the technical idea into meaningful market data. This is the responsibility of the Middleman organization. The activity will be staffed primarily by marketing and business analysts with inputs from the technical staff.

New Idea Identification. This activity identifies new ideas for application of STS. This will be a responsibility shared between NASA and the Middleman organization, with NASA concentrating on its internal organization. Implementation of the methods presented in Task II will be accomplished here. Staff requirements include specialists in surveys and group techniques for idea generation.

Idea Screening. This activity sorts those ideas which have little or no market value from those with potential value. This is the responsibility of the Middleman organization. The group will have to develop its own techniques to accomplish the screening. As pointed out earlier, few formal methods with proven success exist for screening.

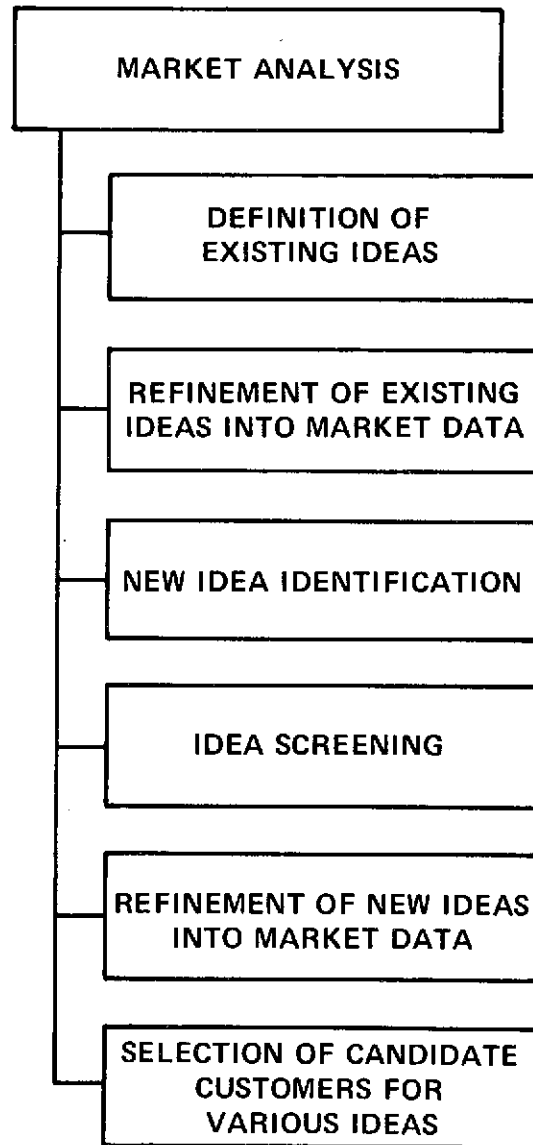


FIGURE 6. ACTIVITIES IN THE MARKET ANALYSIS FUNCTION

For this reason this activity should be staffed with talent experienced in idea evaluation.

Refinement of New Ideas Into Market Data. This activity will probably be accomplished by the same staff and in the same manner as that for the existing ideas. This is the responsibility of the Middleman organization.

Selection of Candidate Customers for Various Ideas. This activity will involve the matching of the analysed ideas with potential users. These users may be individual organizations, groups, or classes of organizations. This will be the responsibility of the Middleman organization. The talents required are primarily those of market and business analysts.

Technical Development. Figure 7 shows the activities to be accomplished by the technical development function. This is a shared responsibility function. It provides the necessary technical support to insure successful user/use development.

Continuation of Current Developments. This activity insures continuity in the existing NASA research program. It is a NASA responsibility. These efforts are aimed at developing basic science information and are quite necessary to establish a technical base of operation.

Initiation of Development of New Ideas. This activity will insure that suitable technical development is provided for new ideas. This is a shared responsibility with NASA concentrating on general and scientific efforts and the Middleman organization concentrating on specific and proprietary applications of basic knowledge. Staffing will be by specialists in the various fields of technology as required. Except for the technical management team, there should not be a specific, permanent group assigned to this activity.

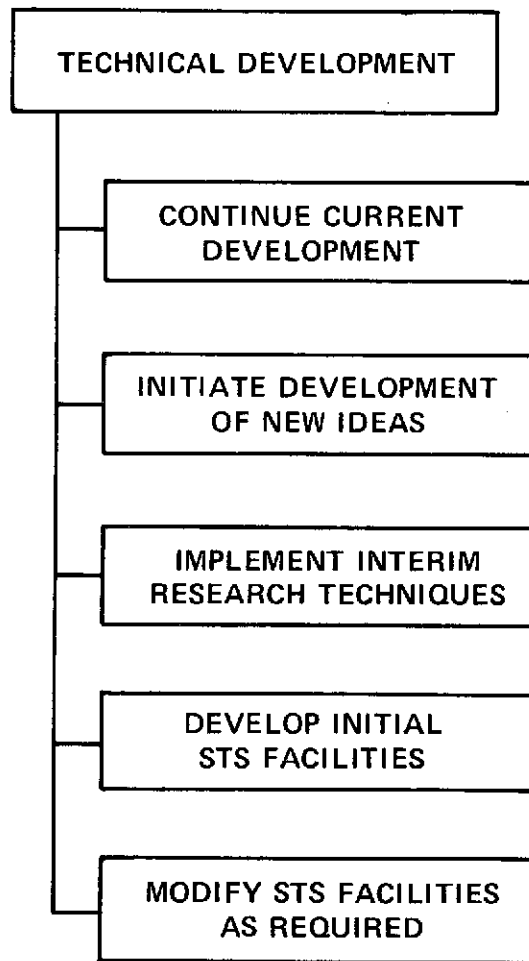


FIGURE 7. ACTIVITIES IN THE TECHNICAL DEVELOPMENT FUNCTION

Implement Interim Research Techniques. This activity relates to the use of interim methods, such as sounding rockets and automated payloads, to accelerate technical development prior to the availability of STS. This is very important from a marketing point of view. The responsibility would be shared as described above.

Develop Initial STS Facilities. This activity will insure the basic facilities are available to the user community. This is a NASA responsibility currently underway.

Modify STS Facilities as Required. This activity will insure that basic facilities remain useful as developments progress. This is primarily a NASA responsibility with guidance regarding the requirements coming from the Middleman organization.

Market Development. Figure 8 shows the activities to be accomplished by the market development function. This activity is the hub of the new user/use activity. It is primarily the responsibility of the Middleman organization.

Strategy for Each Market Category. This activity defines the specific method(s) to be used to successfully develop the user community. This is the responsibility of the Middleman organization. The methods identified in Task III will be employed by this group. The activity should be staffed by senior people skilled in obtaining industry support for new ideas and ventures. An excellent understanding of business methods and operations is necessary.

Implement the Strategies. This activity insures that selected strategies are implemented and modified as required. This is the responsibility of the Middleman organization. The important feature here is the correct use of feedback information to modify strategies in a timely fashion. The same skills as described above are required.

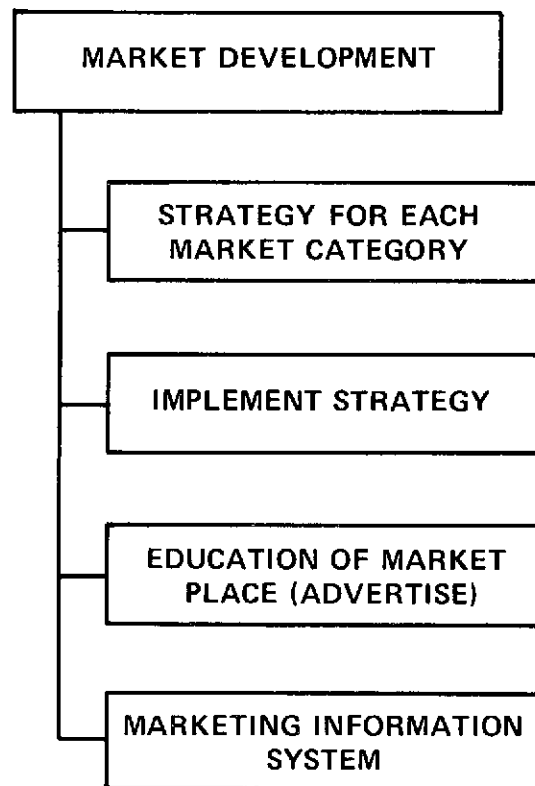


FIGURE 8. ACTIVITIES IN THE MARKET DEVELOPMENT FUNCTION

Education of the User Community. This activity advertises the STS service to the user community. It is a shared responsibility with the major responsibility resting with the Middleman organization. This activity will include presentation to service groups, technical societies, management societies, etc. Also, selection of material for publications and/or general disseminations will be an important function. These activities will be broad and they will serve the purpose of preparing the user community for the targeted sales activities to follow. Skills in mass communications and advertising will be important.

Marketing Information System. This activity will provide documentation of the mass of information being developed. This will be the responsibility of the Middleman organization. This activity should be deferred until after the total activity has been functioning. It will be difficult to anticipate in advance just what data should be included in such a system. It is not recommended that the information system be developed as a control system, at least until extensive operational experience has been developed. Industrial organizations have spent hundreds of thousands of dollars on such systems only to find the ingredients in the decision-making process are not clearly enough understood to permit the systems to function successfully.

Sales. Figure 9 shows the activities to be accomplished by the sales function. This activity actually obtains the new users from the user community. It is primarily the responsibility of the Middleman organization.

Establish Specific Goals. This activity establishes realistic goals for user community involvement in STS. The major responsibility for this rests with the Middleman organization; however, NASA has a minor responsibility to correlate the sales goals with its overall program goals. These goals are established yearly and include a 5-year projection. Without such goals, effectiveness of the program cannot be measured and realistic staffing cannot be undertaken.

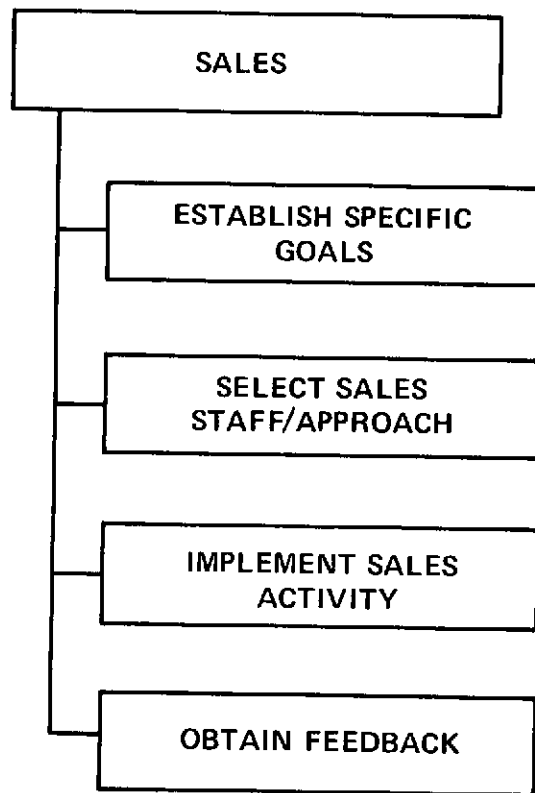


FIGURE 9. ACTIVITIES IN THE SALES FUNCTION

Select Sales Staff/Approach. This activity actually determines the sales strategy to be used and selects the staff appropriate to that strategy. This is tied closely to the marketing strategies and cannot be selected until those strategies have been defined. This is the responsibility of the Middleman organization. This group also modifies existing sales strategies and goals based on feedback obtained from the field.

Implement Sales Activity. This activity initiates, operates, and evaluates the actual procurement of the new users for STS. This is the responsibility of the Middleman organization. This staff will have skills similar to field or technical representatives as used in industry. The specific organization and operation will depend upon the sales strategies finally chosen.

Obtain Feedback. This is a most important activity whereby field information is fed back into the entire system. On the basis of this feedback, market and sales strategies may be altered or even scrapped. This is the responsibility of the Middleman organization.

Operations. Figure 10 shows the activities involved in the operations function. These activities have to do with the actual implementation of users experiments after successful procurement of an STS user. The function has a shared responsibility between NASA and the Middleman organization.

Experiment Design Assistance. This activity involves assisting the user in the specific experiment design, development, and implementation. This is the major responsibility of the Middleman organization with a minor responsibility by NASA. For most applications-oriented activities NASA would not be involved. In basic science experiments, however, it would be appropriate and even desirable for NASA to be directly involved, assuming the user did not object.

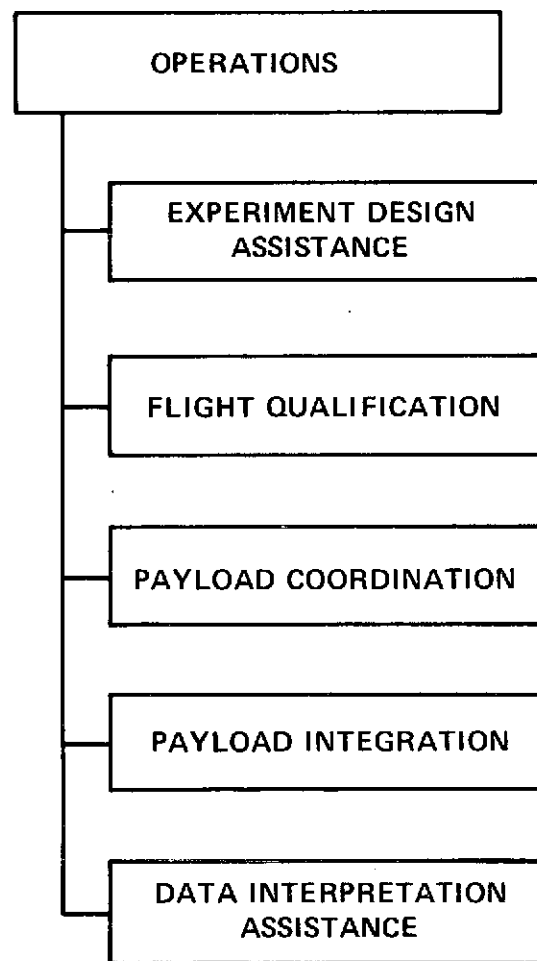


FIGURE 10. ACTIVITIES IN THE OPERATIONS FUNCTION

Flight Qualification. This activity insures that the package flown by a user will meet all safety and policy conditions. This is a NASA responsibility. This area may cause some problems with industry, particularly relating to proprietary rights, but unless a significant change in basic policy develops it seems certain that NASA will insist on performing this activity.

Payload Coordination. This activity is aimed at identifying, sorting, and grouping compatible payloads from the user community. This will have a significant bearing on the cost and schedules that can be offered the user. It is the prime responsibility of the Middleman organization with backup support from NASA. This activity will be accomplished by technical staff skilled in the specific technologies being studied and also in space packaging and systems operations.

Payload Integration. This activity is aimed at actually accommodating specific payloads in a particular STS flight. This will be the prime responsibility of NASA with backup assistance from the Middleman organization. This activity may eventually become routine enough through the use of standard equipment that the Middleman organization may be able to assume prime responsibility.

Data Interpretation Assistance. This activity is aimed at assisting those users who do not have sufficient technical know how to fully and meaningfully interpret the results of their space experiments. Since usually this will involve a specific application as opposed to basic research, the prime responsibility for this activity would rest with the Middleman organization. In those areas where basic research or nonproprietary rights were involved, NASA could be used to support this activity.

Customer Relations. This activity is aimed at only one target: insure that the user of STS is happy. As such it is a shared responsibility but the major burden falls on the Middleman organization. The specific

structuring of a customer relations function is dependent upon the marketing and sales strategies selected. As such, it is not structured or defined until the new user activity is well underway. The important feature is that a source of information and contact exist independent of the sales (field) staff. At a minimum, an ombudsman should be provided for the user community in both NASA and the Middleman organizations. Many potential lost users can be saved by this function.

Public Relations. Figure 11 shows the activities to be accomplished by the public relations function. This activity is aimed primarily at public image, acceptance, and education. It is primarily the responsibility of NASA. This is a function NASA has accomplished very well in the past.

General Public Education. This activity is to acquaint the general public in a nontechnical way about the STS and its potential benefits to mankind and tax payers. This is a NASA responsibility and can probably be accomplished by existing public relations staff.

Targeted Activities. This activity is aimed at specialized information to selected groups or classes of organizations. This activity should be carefully coordinated with the educational activities of the market development function. Specific activities will be tied to selected marketing and sales strategies. For this reason, the Middleman organization will have an advisory input while NASA has the prime responsibility for the activity.

Information Offices. The activity is aimed at providing a focal point for "off the street" inquiries and would be the responsibility of NASA. These offices would provide general information about STS and its uses and could provide counsel to interested parties as to how to get involved in the use of STS. Such offices should be available in Washington and at each of the operating centers around the country. Again, this can probably be accomplished with existing organizations and staff within NASA.

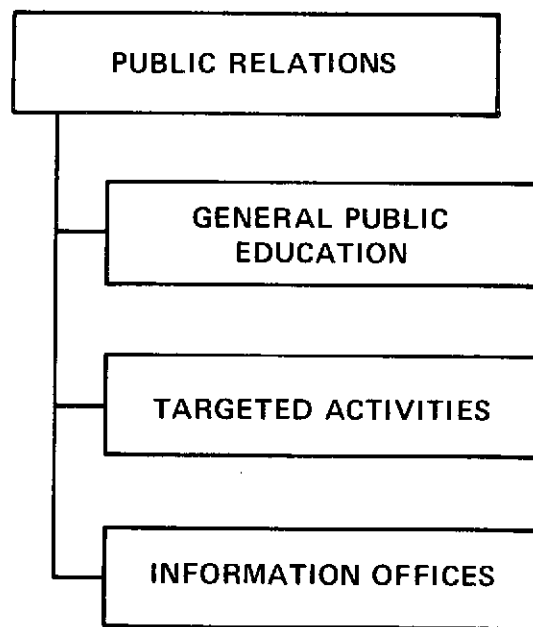


FIGURE 11. ACTIVITIES IN THE PUBLIC RELATIONS FUNCTION

### Organization

Figure 12 presents an overview of how the nine major functions of the user development operation would be structured. A NASA program manager would lead the total effort. Reporting directly to him would be a deputy manager for NASA operations, the program administration team, and the Middleman organization's program manager. Each of the functions are shown as having contributions from both NASA and the Middleman organization. In some instances these contributions may be only advisory or liason, but none-the-less, no activity should be conducted independently by either organization.

Figure 13 goes into greater detail regarding how the specific activities in each function would be structured. The relationship between NASA and the Middleman organization are shown by the directions in which the activity boxes point. Solid lines on the activity boxes indicate prime responsibility for that activity; broken lines indicate a minor or backup responsibility for that activity. Blanks indicate no direct involvement by that organization in that specific activity.

Figure 14 shows a suggested distribution of responsibility within NASA for the various functions defined. Basically NASA should use a centralized structure, i.e., one organizational unit to administer, coordinate, and control the user community development activity. Specific backup talent, strength, and existing organization are available in the various Centers to assist as required. The NASA function should not be viewed as something that can be spread out to the different centers for either technical or regional reasons. This would be very inefficient and would lead to undesirable duplication of efforts and confusion to the user community. The centralized activity could be located at a Center if NASA so choses. However, care must be taken in organizing the activity to insure NASA-wide representation.

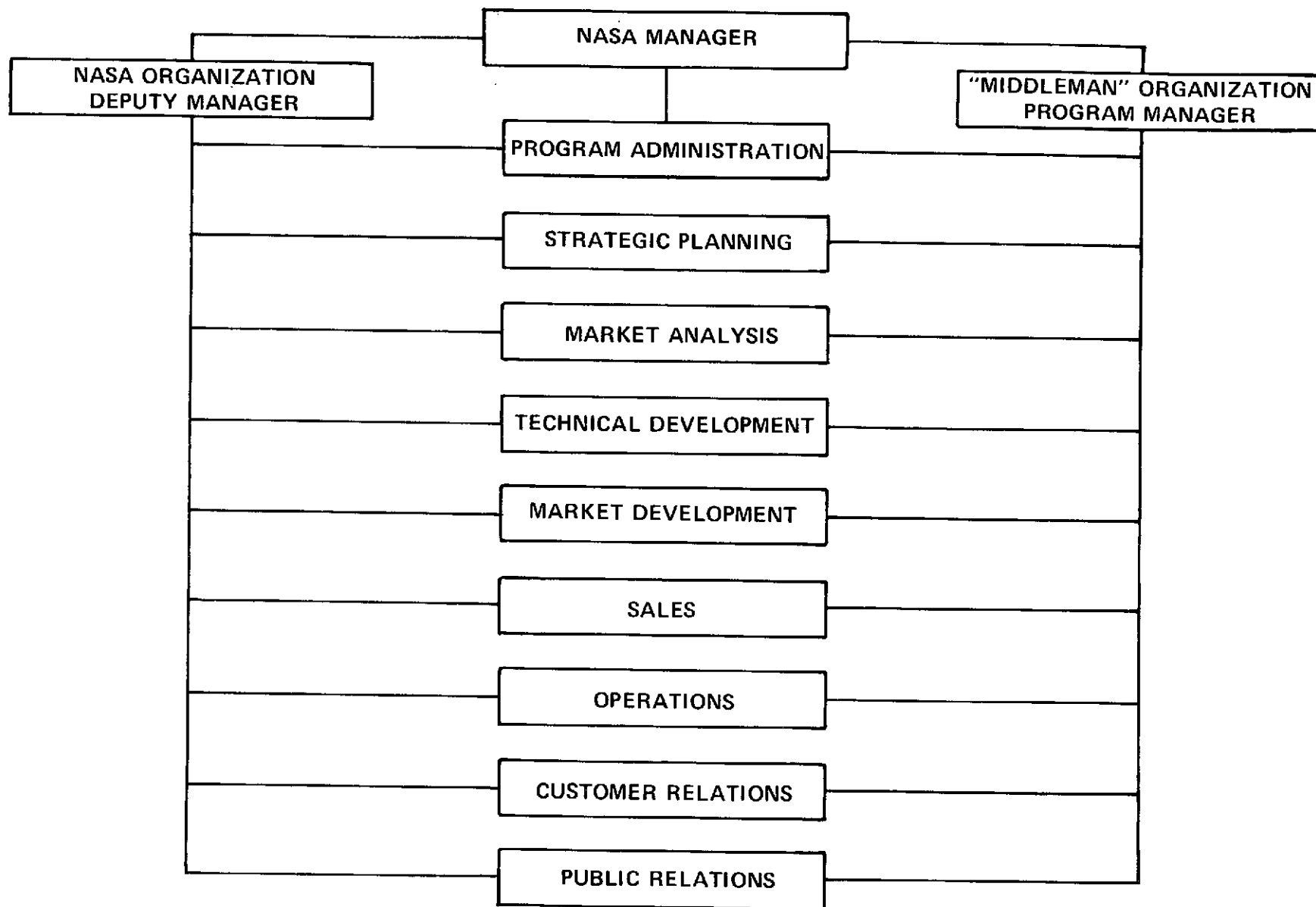


FIGURE 12. FUNCTIONAL ORGANIZATION INDICATING APPROPRIATE RESPONSIBILITIES OF NASA AND THE MIDDLEMAN ORGANIZATION

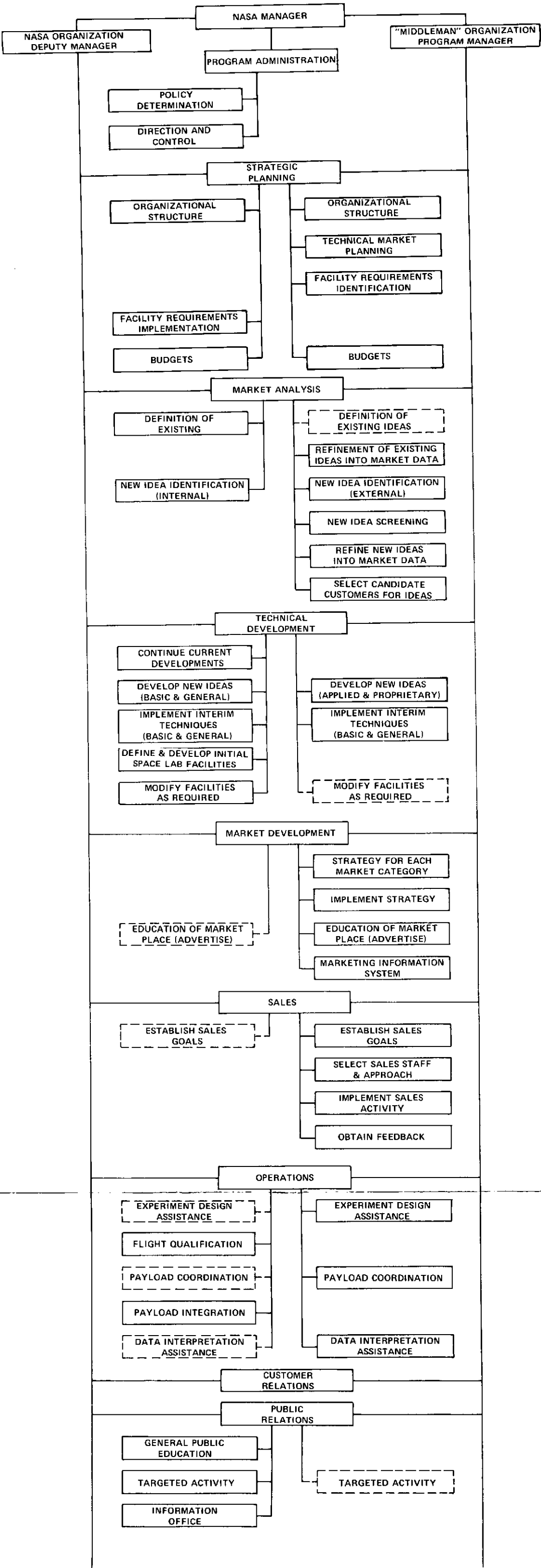


FIGURE 13. ACTIVITY RESPONSIBILITY WITHIN EACH FUNCTION

PROGRAM MANAGEMENT	CENTRALLY CONTROLLED; NO CENTER ROLE
STRATEGIC PLANNING	CENTRALLY CONTROLLED; CENTER SUPPORT
MARKET ANALYSIS	CENTRALLY CONTROLLED; CENTER SUPPORT
TECHNICAL DEVELOPMENT	CENTRALLY CONTROLLED; CENTER EXECUTION
MARKET DEVELOPMENT	CENTRALLY CONTROLLED; CENTER SUPPORT
SALES	CENTRALLY CONTROLLED; NO CENTER ROLE
OPERATIONS	CENTRALLY CONTROLLED; CENTER EXECUTION
CUSTOMER RELATIONS	CENTRALLY CONTROLLED; CENTER SUPPORT
PUBLIC RELATIONS	CENTRALLY CONTROLLED; CENTER SUPPORT

**FIGURE 14. SUGGESTED DISTRIBUTION OF RESPONSIBILITY BY FUNCTION  
WITHIN NASA**

## Implementation

Having defined the recommended strategy or approach to development of the industrial user community, several points regarding implementation should be made. The first of these has to do with the timing of implementation. It might be considered that since STS will not be operational before the end of the decade there is no need to be concerned at this time about the development of the industrial user market. This is not true. Industry makes business plans 5 years in advance. They use these plans for allocation of budgets and resources. If NASA hopes to achieve significant financial support from industry in the 1980 time frame, it must start now to build the confidence levels and to obtain the interests that will allow that support to be placed in the budget forecasts. It should be pointed out that initial research and development costs are only a small fraction of the total cost to industry to bring a product to market - see Figure 15<sup>(2)</sup>. The cycle shown typically takes 3-5 years even in an existing product line. For something as novel as the applications of STS, this cycle could well stretch to 10 years. Therefore, it is very important that concentrated efforts be initiated as soon as possible. To achieve this will require a significant investment, measured in millions of dollars, by NASA at the earliest possible time. Delays in initiating these functions will reduce the opportunity to get industry involved in activities such as the sounding rocket program and, thereby, will delay experimental involvement until well after STS is operational. This is certainly not desirable.

Recognizing that NASA may not have budgets available for full-scale implementation immediately, it should be possible to undertake certain additional study activities which would be useful. For example, certain ones of the methods suggested for use might be field tested to determine the extent of new user community acceptance. Tests could be

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(2) Handbook of Modern Marketing, Edited by V. P. Buell, McGraw-Hill Book Company, New York (1970), "Managing New-Product Development" (C. Jones and R. F. Sherman) p 3-57.

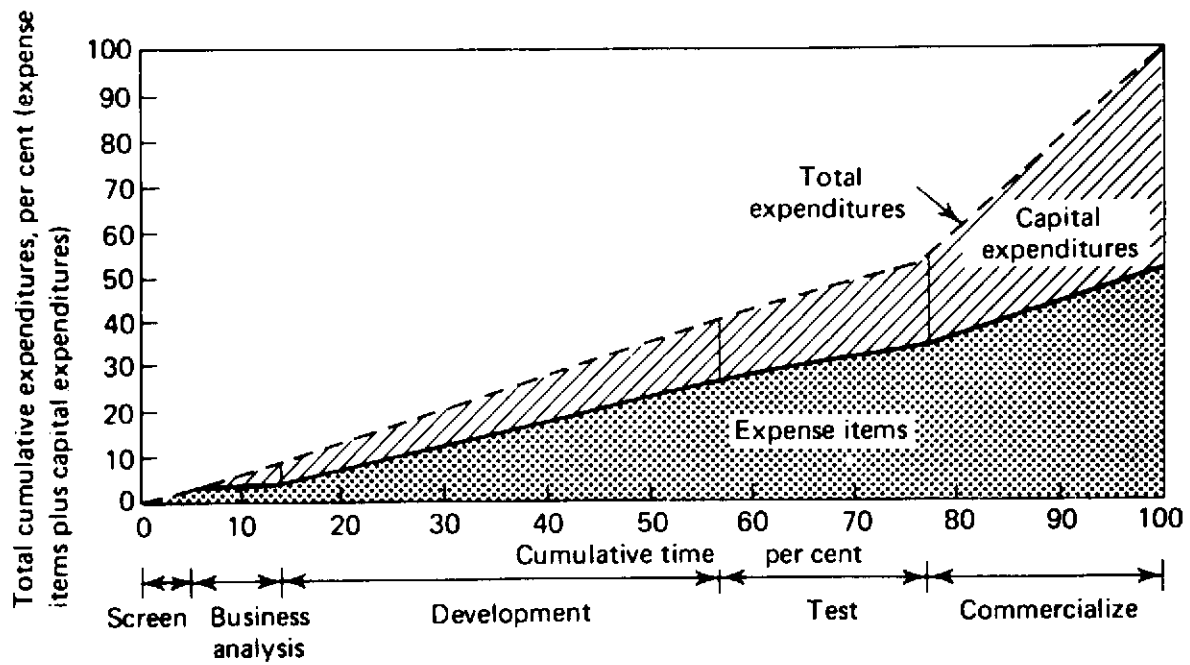


FIGURE 15. CUMULATIVE EXPENDITURES AND TIME BY STAGE OF EVOLUTION

C.2

made of those approaches for new idea determinations which were deemed in Task II to be the best for initial use. Those included brainstorming, brainwriting, technical society/associations presentations, regional sessions (synetics) and direct seminars to potential users. The depth to which these could be evaluated would of course be dependent upon the resources available. Figure 16 shows the relationship of the required steps in the evaluation process.

Similarly selected methods for new user development could be evaluated. These might include personal indirect, direct mail, trade shows, direct and regional seminars, and technical and civic meetings. Note that the methods chosen are heavily weighted toward educating the potential user. In this way, maximum benefit might be derived even though the magnitude of the efforts might not permit full success to be achieved. Figure 17 shows the steps involved in evaluating the selected new user development methods.

It should be emphasized that the suggested evaluations given above represent only a very poor alternative to the recommended approach of full implementation of a user development operation. The magnitude of the required effort is very large and it will not be successfully accomplished without a full commitment at the earliest possible time.

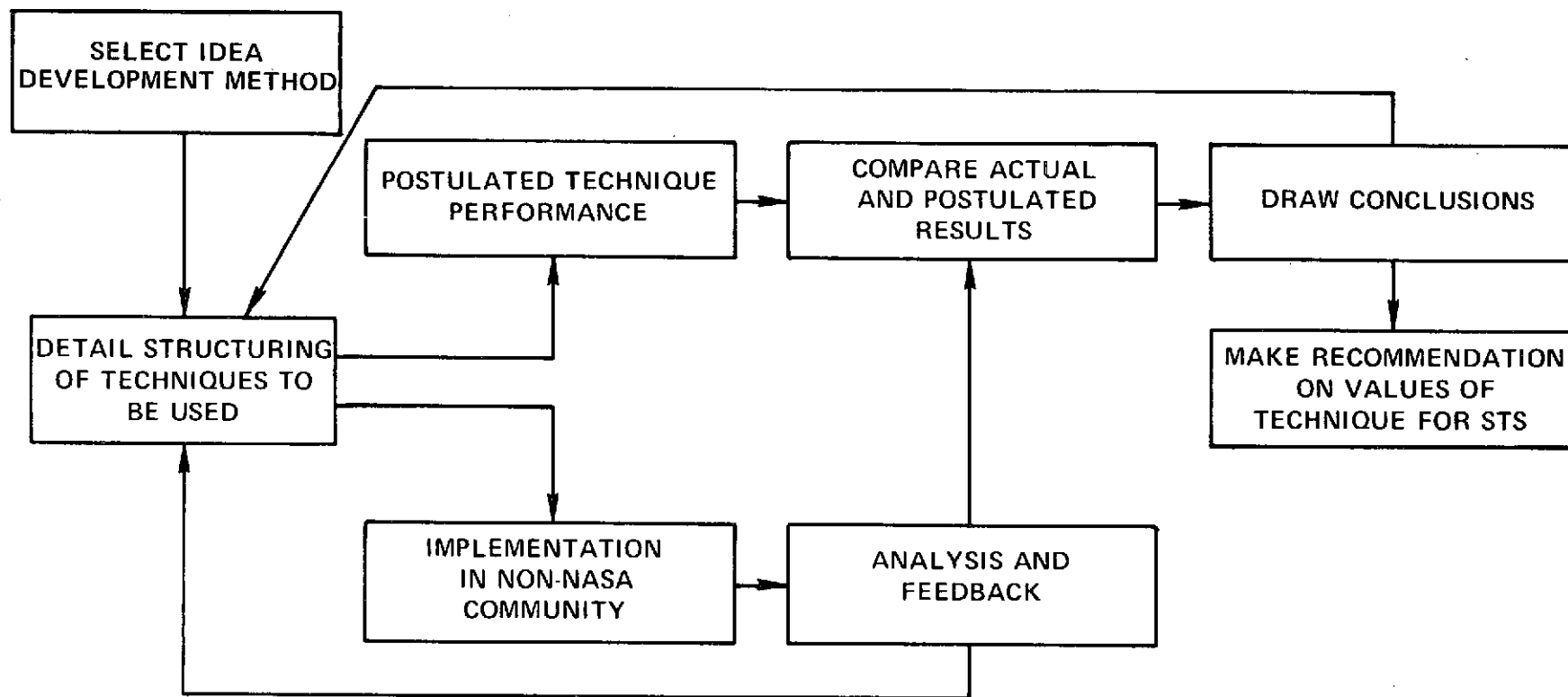


FIGURE 16. RELATIONSHIP OF STEPS REQUIRED IN EVALUATION OF SELECTED TECHNIQUES FOR NEW USE IDENTIFICATION

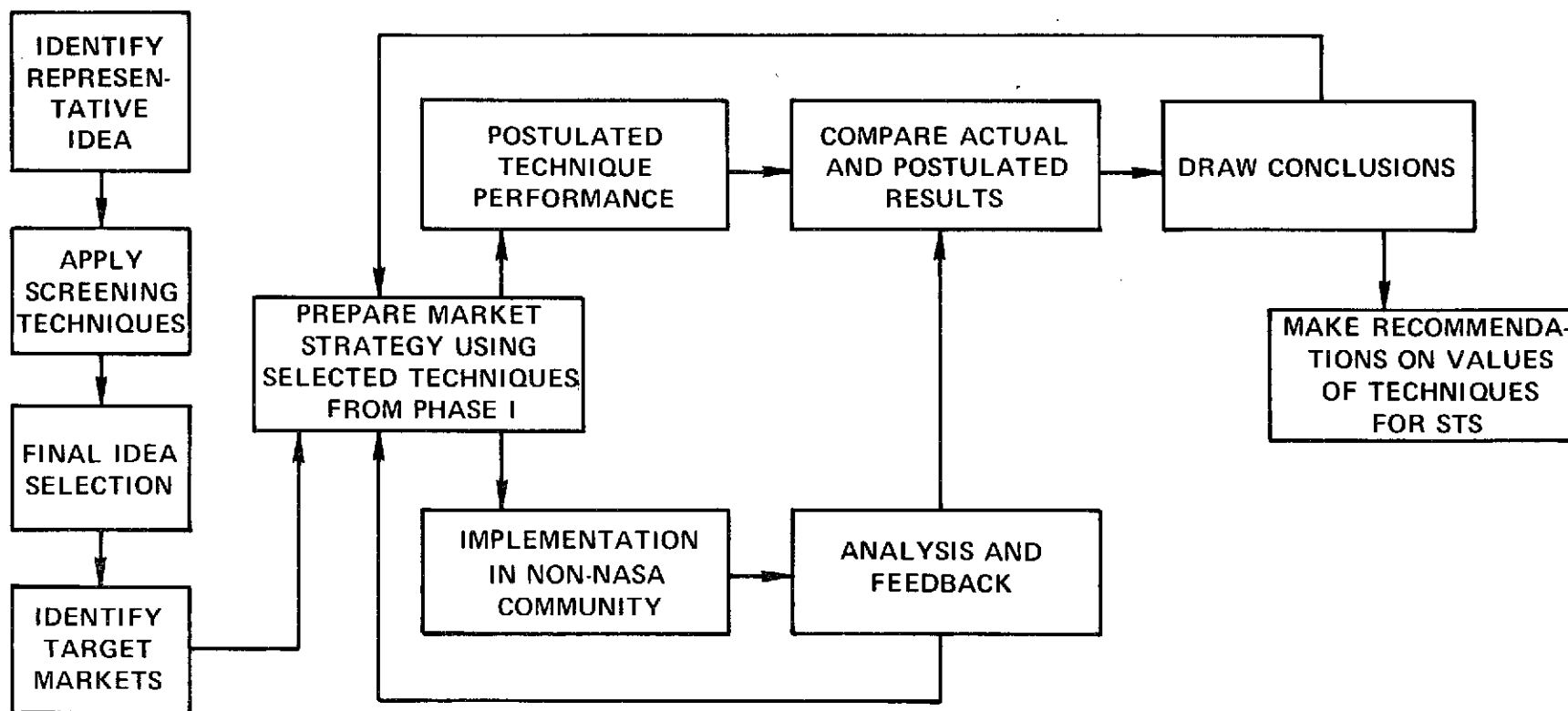


FIGURE 17. RELATIONSHIP OF STEPS REQUIRED IN EVALUATION OF SELECTED TECHNIQUES FOR NEW USER IDENTIFICATION

CONCLUSIONS

The following conclusions result from this study:

1. There is a need for an active effort aimed at developing the industrial user community for STS.
2. The effort required is very large and should be implemented immediately if industrial support is to be forthcoming by 1980.
3. NASA does not possess the necessary experience in dealing with industrial market development.
4. Real barriers exist which will make it very difficult for NASA to directly develop the industrial user community.
5. The use of a Middleman organization represents the best strategy for developing the industrial user community.
6. The Middleman approach allows NASA to concentrate on what it does best and provides an opportunity to leverage its resources in the future.
7. Successful development of the industrial user community can be achieved by employing marketing methods commonly used by industry.

RECOMMENDATIONS

The following recommendations are made as a result of this study:

1. NASA immediately initiate an industrial user development operation.
2. The industrial user development activity should be centrally operated in NASA and not be divided up among the various Centers.
3. NASA utilize a Middleman organization approach in development of the industrial user community.
4. NASA implement fully the approach recommended in this study at the earliest possible time.

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